

COMPUTERWORLD

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NEWS IN BRIEF

City, County DP Links Up, Cuts Cost

MOBILE, Ala. A joint computer project set up by the city and county governments has saved the taxpayers here about \$57,000 during the first nine months of operation.

The city had originally budgeted \$101,537 for its own data processing service and Mobile County allocated \$110,743 for its operation. But the county decided to buy its own computer, rather than rent, and the city contracted for time on the county computer, according to County Commission President Howard Yeager.

Personnel from both operations were combined so that the actual cost of equipment and expenses for the joint service was nearly \$57,000 less than the combined budget, he said.

Yeager said when the computer is completely paid for in about 18 months the county can expect to save an additional \$4,000 per month.

Certification Foundation Sets Organization Meeting

CHICAGO The executive councils of the Association for Computing Machinery (ACM) and the Data Processing Management Association (DPMA) have approved participation on an organizing committee seeking to generate a final proposal for establishing a Computer Foundation. The committee will be cochaired by Fred H. Harris, director of the Computation Center, University of Chicago, and John K. Swearingin, CDP, vice-president and general manager of Environmental Research Corp., Las Vegas.

The concept of the foundation was approved recently by both ACM and DPMA. It originated out of recommendations made by the Certification and Testing Advisory Committee.

An open meeting will be held Jan. 17 at 10 a.m. in O'Hare Inn, Des Plaines, Ill., to discuss plans for the organizing period. Individuals as well as representatives of interested societies wishing to attend should contact Mrs. Jamie Fox at Computer Foundation Organizing Committee, P.O. Box 1442, Chicago, Ill. 60690.

On the Inside This Week

TP Access Methods	Page 11
Seen Residing in VS	Page 11
IBM Wins Battle	Page 23
Over 'Secrets' Papers	Page 23
Computer Industry	Page 23
Editorial	Page 26
Education	Page 10
Financial	Page 32
Software/Services	Page 8
Systems/Peripherals	Page 17



Disk drives are shielded from any water damage.



(California Highway Patrol Photos)

Univac mainframes assume an air of secrecy at National Guard headquarters.

Memory Path Like 40's Accelerator Boosts 360/30

By Ronald A. Frank
Of the CW Staff

NEWTOWN, Pa. Computer Hardware Consultants & Services Inc. has announced a hardware enhancement for 360/30 users to make their system operate at speeds comparable to the Model 40.

The 360/30 Accelerator feature doubles the memory "fetch" rate of the mainframe, decreases channel interference and alters the microprogramming to increase throughput.

The fetch rate is doubled from 1 byte/cycle to 2 byte/cycle with the accelerator on a cycle steal principle, and using a double the throughput of the mainframe, a CHCS spokesman said actual increases "will be in the eyes of the beholder."

The decrease in channel interference means that faster peripherals will see a marked improvement in efficiency, a spokesman said. The Model 30 operates on a cycle steal principle, and using a priority scheme it services the slower I/O devices first. By eliminating the number of cycles that each channel needs, faster peripherals will perform more efficiently, a spokesman said. The net effect will be to drive I/O devices such as 1,100 line printers at rated speeds, he added.

By improving "all of the Model 30 microprogramming," some instructions will execute at "double the normal speed," the spokesman said. While the accelerator feature "will not be all things to all people," it will be most significant for compute-bound Model 30 users, the spokesman said. However, an

I/O-bound 30 user will also see some improvement, he added.

"We are following right behind the 370/125," a CHCS spokesman said. "Everything the 125 can do, the Model 30 user will be able to do with real memory and the new [accelerator] features."

The hardware enhancement will require the Model 30 user to have at least 128K of storage. The present IBM memory

Spotlight on User's Lib

limit is 96K for the Model 30, the spokesman said.

Because of the major changes to the system, CHCS is assuming that IBM will not support 30s which have been upgraded with the accelerator. But CHCS will provide complete maintenance and diagnostics, the spokesman said, through its existing field force.

The device will be easy to install on any 30 and will be located on the backboard within the mainframe. It can be installed "over a weekend," the spokesman said. The accelerator is scheduled for first deliveries in April but initial installations will begin this month, the company said.

The accelerator will cost \$880/mo on a two-year lease. Purchase price will be about \$33,000. The feature will be available through all major leasing companies which have installed Model 30s, or direct from CHCS. The company is at 8 Pleasant Run, 19840.

Water Damage Avoided

Plastic Protection Proves Worth in Fire

By Marvin Smalheiser
CW Correspondent

SACRAMENTO A \$1,200 investment in plastic covers several months ago protected about \$15 million worth of computer equipment during a fire which ravaged the state headquarters of the California National Guard.

The equipment was on the second floor of the block-square building here which housed the Guard headquarters and the state Department of Motor Vehicles (DMV).

Ira Isbell, chief of the EDP Division of the DMV, said the plastic covers prevented any water damage. The equipment was up and fully operational within four days after the effort to preserve the files, he said.

The fire, discovered about 11:30 p.m. Christmas day, caused \$5 million damage in the 10-year-old building.

The DMV EDP Division is located in two buildings, the second across the street.

In the gutted building the equipment included a Univac Series 70/55 which controls and accesses all vehicle records in state, and a Univac Series 70/6 in a multiprogramming mode that controls the name index with 35 million names, and serves as a cross index to both driver records and vehicle records.

Across the street are a Univac Series 70/45 that acts as a front-end communications processor and a Univac Series 70/55 to control the data base for all driver records.

Adjacent to the computer center in the building where the fire occurred is a large key-entry room with 200 CRT terminals and about 40 keypunch machines.

Isbell was called to the fire within a half hour.

(Continued on Page 2)

Vendor Switch Involves IBM, User in Hassle

By Michael Weinstein
Of the CW Staff

WARWICK, R.I. IBM is using "the resources available to the bureaucratic structure of a large corporation" in an attempt to dissuade a user from moving to another vendor, according to this city's DP director.

"These resources manifest themselves in a letter from IBM submitted after it became known the city was contemplating switching mainframe sources - which implies local data processing personnel are not competent to decide on hardware selection," DP Director George Waterman said.

The letter, which found its way into the hands of local officials, suggested that no decisions be made until the city had time to improve certain areas of operation and formulate a long-range plan.

Looking Around

"Before we started looking at other sources for equipment, IBM had no com-

(Continued on Page 2)

Plastic Covers Save DP Equipment

(Continued from Page 1)

hour after it was discovered and had the plastic covers put on all of the equipment in the 9,000-square-foot computer area and in an adjacent data-entry area.

The covers were safely on before the water was able to seep through from the fire on the fifth floor of the six-story building.

About 3 a.m., Isbell said it appeared the whole building would be lost and an effort was made to move the data files out of the building into a second computer center across the street.

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Isbell said plastic covers had been acquired for equipment in both buildings and there was enough to cover all electronic equipment in the computer room, peripherals in the key-entry area and tapes in the library.

The division has been very security-conscious, he noted, and had formulated plans in case of an emergency. As an afterthought, it was decided to buy the plastic covers.

Data Bases Moved

Two data bases were moved - one involved 80 magazines of magnetic cards containing all vehicle records in the state and the other included 50 disk packs containing 35 million names used to cross-index both the vehicle records and the state driver record file located across the street.

About 25 persons including the computer night crew, janitors and Univac service engineers helped move the data files out of the burning building.

Some 8,000 reels of tape in the tape library, covered by plastic, were moved

out the next day to protect them from the dampness remaining in the building.

The DMV computer system serves the state's Law Enforcement Division, courts and the DMV, which needs access to available records, particularly during what is now the peak vehicle registration period.

Input involves 10,000 additions or deletions a day.

Cause of the fire was not determined but state fire investigators are considering the possibility of arson. No one was injured in the fire.

Good Backup

With the help of the equipment located in the building across the street, Isbell said, it was possible to get as much as three-quarters of the vehicle record file up by 1 p.m. the day after the fire.

While the power in the main building was still down late in the week, the security plan allowed either center to draw on the other's power source, so that the equipment in the damaged building could be operated.

CW Promotes Farmer, Patterson

NEWTON, Mass. - An expansion of editorial activities and several staff promotions have resulted from Computerworld's continued growth.

Patrick J. McGovern, president and publisher, announced that Robert M. Patterson has been promoted to the corporate office of vice-president, editorial, responsible for planning the growth and development of the newspaper.

V.J. Farmer has been promoted from news editor to managing editor "in recognition of his organization and leadership skills" which, McGovern said, "have played a key role in the development of Computerworld."

Washington Office

Additionally, E. Drake Lundell Jr., com-

puter industry section editor, has been transferred to the new Washington, D.C., office, where he will also serve as bureau chief.

Staff writer Edward J. Bride has assumed the newly created position of general news editor. Bride and Technical News Editor Ron Frank report directly to the managing editor.

During Patterson's tenure as executive editor, McGovern noted, CW achieved "leadership rank in paid circulation," over 54,000, as well as in reader preference and editorial reputation, among all business and trade publications related to computers and data processing.

Patterson will initially concentrate in his position on investigating new publishing opportunities in major foreign markets.



E. Drake Lundell Jr.

Edward J. Bride

On Photos by Leslie Farnham

V.J. Farmer

California Highway Patrol Photo
James J. Waterbury, Univac Division, points to water that leaked from fire on the fifth floor to the computer room on the second floor.

IBM Involved In User Hassle

(Continued from Page 1)

plaints about the manner in which we ran our department," Waterman noted.

"In fact, in April of 1972, IBM felt we were competent enough to order a System 3 Model 10, but when we reevaluated our needs and moved toward a B2510, they felt a study was required," Waterman charged.

Waterman cited a letter from the local IBM sales representative and systems engineer which states:

"We (IBM) are of the opinion that a hardware recommendation upon our part would be premature at this time. There are immediate problems such as machine scheduling and documentation which should be addressed. We feel that a survey of user departments and the completion of a long-range plan should serve as the basis for hardware and software considerations."

"With this view in mind, we are recommending a specific plan of action for the Warwick Data Processing Department, and are including areas of assistance to which IBM can provide aid in the implementation of the action plan."

Waterman maintained: "IBM's recommendations have led to a rise in our organizational problems, and have hampered our working relationships."

"Had our IBM System 3 been left on order I am sure no such analysis would have been made," he continued.

IBM's ensuing recommendation to delay ordering any hardware until a long-range plan could be developed by municipal administrators - as opposed to data processing personnel - seems to be an attempt to retain this account, he asserted.

As to the assertion that the city had no plan, Waterman stated, "We had a plan, but our plan did not conform to IBM's plan."

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Tape drives. (Configurations to go with both IBM 360 and 370 systems. See next column.)

370

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360/370

Tape drives.

Ampex pioneered tape and tape drives—and has led the industry in sophistication ever since. The TM-34/TC-38 is typical with totally compatible flexibility. The TM-34, replacing 3420, 2420 and 2401 tape drives, has all the advantages of IBM 3420 drives, including speeds up to 200 ips. The TC-38 controller is compatible with all future changes in IBM OS through controller microprogram updating without hardware changes... PLUS superior error-correction capability.

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Editorial

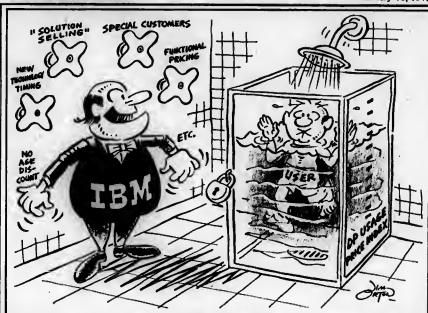
A Professional Responsibility

Only positive action on the part of computer users and others in the computer community can debunk the charge that computer people have traditionally failed as social activists.

Groups like the ACM and the DPMA should lead in the effort to translate the ideals expressed by many in the computer community who want to use their DP skills for the whole society.

While many social causes cannot be endorsed by everyone in the community, there is little disagreement over the need to clean the environment or train disadvantaged persons for meaningful careers.

With a central focus on society's problems the professional groups must show the way, thus emphasizing their responsibility to their members as well as the entire DP community.



"Deep enough?"

A Complex Industry Demands Accurate Knowledge

By Bruce Gilchrist and Milton R. Wesel

Special to Computerworld

On Nov. 20 the U.S. Supreme Court handed down its first decision on a strictly computer-related issue. Specifically, the court ruled against the patentability of certain kinds of computer programs. Important as this particular ruling is, perhaps the greatest long-term significance lies in Justice William O. Douglas'

current Justice Department/IBM contest would be improved if the parties had access to the information derived from broad public hearings?

Sen. Philip Hart (D-Mich.), in his proposal for an industrial reorganization court, appears to be thinking along the same lines. More generally, a study of the government's involvement in the computer industry prompted us to recommend establishment of a Commission on the Computer Industry to conduct a two-year inquiry and to recommend elsewhere that the Justice Department hold public hearings on the form of relief to be

sought in its case against IBM.

To be sure, all these proposals may be somewhat inconsistent with our tradition of having the Justice Department alone of the prosecutive antitrust cases on behalf of the general public. But inroads have already begun to creep into that tradition, and the question to be considered is whether the complexity of the computer industry does not demand a modification in our ways of doing things.

Francis Bacon wrote, "Knowledge is power." Perhaps the best way the country can manage the computer industry and hence make sure it is used for the

public good is to make sure that knowledge of the industry is both reliable and widespread.

The computer is indeed a key tool of the growing knowledge industry. It would be ironic and possibly tragic if we get into difficulties because of our lack of knowledge about the computer industry.

Bruce Gilchrist and Milton R. Wesel are the authors of "Government Regulation of the Computer Industry" (Aflips Press 1972). Gilchrist is executive director of the American Federation of Information Processing Societies, Inc. Wesel is a New York attorney.

Viewpoint

final paragraph where, in behalf of a unanimous court, he writes:

"If these programs are to be patentable, considerable problems are raised which only committees of Congress can manage, for broad powers of investigation are needed, including hearings which canvass the wide variety of views which those operating in this field entertain."

These words focus on a fundamental problem applicable to many aspects of the computer industry. It is not only a new but a very complex industry, which is difficult to deal with in terms of either established procedures or ways of thinking.

A computer program was simply not considered by the writers of our patent laws. Similarly, the framers of the antitrust laws had no concept of the relative inflexibility which the computer may be building into our economic structure or the ease with which information could be passed between companies by means of computer-controlled communications.

Investigation Needed

In suggesting that a broad congressional inquiry is necessary, Douglas is adding the weight of the Supreme Court to other suggestions that the time is ripe for some form of investigation.

While others perhaps have not been as specific as Douglas, the common concern is that decisions are being made about and within the computer industry which will undoubtedly have a major impact on our economic life but that these decisions are being made without adequate knowledge.

Antitrust is clearly a primary area of concern, and the confusion which has typified the discussions about what form of relief the Justice Department should seek in its current suit against IBM illustrates the difficulty of the problem.

If the Supreme Court feels the patenting of programming should be decided on the basis of extensive congressional hearings, doesn't it follow that the outcome of the

Certificates Complementary

I have just finished reading Alan Taylor's column on "Attack on SDE Certification May Have Backfired" (CW, Dec. 13). I must say that as a CDP holder and a member of DPMA, I agree with Taylor and am rather horrified at the attack to which he replied.

While I'm not certain the attack could be construed as unethical when matched against the Code of Ethics of the CDP holder, it is certainly unprofessional. Since Taylor is a fellow holder of the CDP, I believe he should make the name of Mr. X known to the rest of us so we might make appropriate requests to the Certification Council to have him removed and, possibly, if his comments are indeed unethical, have him stripped of his CDP.

I am at present undergoing the certification process by SDE and don't believe the two certificates are incompatible, but complementary.

Eugene T. Dolan, CDP
Assistant Professor
Federal City College
Washington, D.C.

Beware the Quack!

Alan Taylor's article on "Attack on SDE Certification..." and previous articles in *Computerworld* are my only source of information on the examination for the Certificate in Data Education.

But, Taylor seems to point out the most serious flaw of that examination. He states: "The CDE is based on the concept that practitioners are entitled to certification if they cannot be proven ignorant or dangerous."

It seems to me that, for any examina-

tion, the burden of proof rests on the candidate. She or he must prove competence. That is true for journeyman plumbers, elementary school teachers and surgeons.

No less can be accepted from persons wishing to teach "data."

Adventurously acquired ability sufficient to doubt ignorance is adequate for becoming a quack. Many universities offer formal course leading to certification as teachers or "data" professionals.

Helmut E. Thies
"AB, MBA, CDP"

Washington, D.C.

IBM Leads the Band

The Dec. 6 article entitled "Users Awaken to Security Needs" contains a major error.

The article states in the fourth paragraph:

"Examining the problem from new or different angles has become somewhat popular and the last to climb on the bandwagon was IBM, which last spring announced its long-term, \$40-million project to develop secure systems."

On the contrary, IBM started the bandwagon in November 1967, when it created a separate department exclusively concerned with customer data security. In addition, IBM has been building security provisions into its hardware for over two years. Just one example of this is the magnetic stripe card reader on terminals. There are numerous other examples.

Francis M. Carter
President
CTMS, Inc.
New York, N.Y.

Some DPer's Take Plunge

On the front page of the Dec. 13 issue is

the headline "DPer's 'Fail' Social Role." We would like to inform your readers that there are some DPer's currently getting their hands dirty on a long-term basis with the United Farm Workers movement in California.

In the April 5 issue we explained how we had dissolved the paper jam that had developed in the union by bringing in several DP professionals (living on subsistence wages) to design and implement a data processing system.

They were successful in that project, and they did not cop out and return to their safe, middle-class existence and leave the union "holding the bugs." They are all still here maintaining the system and working on further applications.

Director of Data Processing
United Farm Workers, AFL-CIO
Keene, Calif.

...From This Corner

I take exception to an article in the Nov. 29 *Computerworld* entitled "APL/Asci Terminals Provide Graphics," in which Scientific Time Sharing is said to be one of the first companies offering APL Asci support.

We are the first APL vendor to support Asci at speeds of 1015/0.060 and 120 char./sec. TSR has a number of applications in production for customers, using Asci devices.

J. J. Weisenfeld
Vice-President, Marketing
TSR, Inc.
Great Neck, N.Y.

Computerworld welcomes comments from its readers. Letters should be addressed to: Editor, *Computerworld*, 197 Washington St., Newton, Mass. 02160.

1973 Objective:

Let's Make DP a Recognized Profession

Recently Robert Sennot wrote that he had always feared my possession of the CDP had blinded me to the virtues of other data processing professionals who might not hold it [CW, Dec. 6]. Well, Robert, this first effort of 1973 is for you and for all others who are interested in improving the quality of data processing. And you do not have to fear what I am going to say - because it includes a forecast that data processing quality improvement is going to be greatly emphasized

The Taylor Report
By

Alan Taylor, CDP



"I cannot see how votes can be meaningful unless they not only guide the (society) administration into certain positive acts, but also warn them away from other not so popular items." - Hamilton Armstrong Jr.

by CDPers and non-CDPers alike during 1973.

Naturally, I shall try to do my part in these columns, because my personal interests have always been in favor of really good data processing. I have perhaps overemphasized certification in the past because I believed it could be valuable in improving data processing. This belief has recently proven true, through the actions of the CDP holders who have formed the Society of Certified Data Processors (SCDP). They have now become a major force moving toward strong professional data processing standards.

In the two years since it was formed (at the instigation of a reader of this column), the SCDP has pioneered the development of standards for data bases, for constitutionally protected data, and for other items.

It is working within the established groups and while it is still too soon to see the full effects of its work, the value of the trailblazing is obvious.

But this work would not have been performed, and its value would have been lost to the profession if the certification program had not existed to pull the members together.

Late in 1972 the SCDP discovered that interest in developing better standards for data processing was not unique to CDP holders who joined the SCDP - but is a major interest of most CDP holders, inside and outside the SCDP.

This interest was discovered when a large group of CDP holders was polled by SCDP Secretary Jerry Martin. He designed the questionnaire to leave the CDPers complete freedom to answer what they felt a CDP holders' organization should do. The results showed most of the respondents were putting one aspect or another of improving the quality of data processing as being their prime professional interest.

Perhaps the most succinct, effective response came from Grover Rodich, CDP of Portland, Ore. He wrote "Prime Objective - establish DP as a recog-

nized profession." Only a few words, but plenty of meaning.

For while making DP a recognized profession certainly calls for some form of wide certification, it also requires a lot more than that. Professions do not get recognized unless they have standards. For DP to become recognized therefore implies that standards of DP quality will have to be created.

And professions do not get recognized unless they both possess and enforce professional ethics that protect the public. These currently do not exist either, so to carry out Rodich's "prime objective," we will have to develop standards and arrange for their enforcement.

Now, I know the SCDP is listening to Rodich and the rest of the CDPers, because the SCDP is already at work studying these problems.

determine what areas should be worked on in 1973. The results were surprising, because it was the ethical questions rather than the technical ones which came out on top of the voting. Codes of ethics, auditing, and DP standards were the first concerns, while committee work and Cobol languished at the bottom.

One particular item clearly gave SCDP President Hamilton Armstrong Jr. cause to think.

The question was how important are meaningful decisions in a professional society. The response was that they are "vital." But how was this "motherhood" goal to be implemented? That was left to Armstrong!

I am glad to say that Arm-

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2	70%	Create DP Audit Standards	0%
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5	60%	Provide Monthly Activity Report	0%
6	55%	Finance by Compatible Activities	0%
7	45%	(Use Project-type SCDP Structure)	4%
		(Provide Interpretive Reports)	0%
9	40%	Budget 60% Dues for Tech Rpts	10%
		(Urge More Users on Codasy)	6%
		(Use SCDP "Regional Conventions")	6%
10	25%	(Publish SCDP Register)	11%
		(Work at Cobol Liaison)	10%
		(Work on Cobol Concord. Committee)	7%

The above table, taken from the November Monthly Activity Report of the Society of Professional Data Processors shows how members voted for 1973 projects. It can be seen that ethical subjects far surpassed technical ones, indicating 1973 may well see a welcome concentration upon making DP a recognized profession.

SPDP Enrollment Form

Please accept my application for membership. (Annual Dues - \$20) ☐

Please send more details of the society goals and program. ☐
I am () practicing data professional () DP instructor.

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strong's thinking does him and his society credit, for he appears to have taken steps to provide effective elections and real membership control.

Writing in the newsletter he suggested starting a tradition of "after-vote statements."

"These after-vote statements," he wrote, "I envisage being produced by the SPDP president immediately after any decision

or vote. The statement will lay down his interpretation of what the results mean and of how they are going to govern his actions in the future.

"Subsequently," he continued, "such a statement can be used, where appropriate, against him!"

Armstrong explained what he expects to gain from these after-vote statements, and how he thinks they can make the members' votes really meaningful.

"The intervention statements will therefore limit the authority of the (SPDP) president... I cannot see how votes can be meaningful unless they not merely guide the administration into certain positive acts, but also warn them away from other not so popular items."

That is the most professional statement from the president of any data processing society that I know of. I certainly commend both him and his members.

Moreover, let me suggest that if you are seriously concerned about making data processing the profession it deserves to be - (and if you are actually in data processing practice or teaching) - why don't you join the SCDP?

A coupon is attached. Filling it in will help Rodich, Armstrong and myself attain our 1973 objectives for data processing.

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DOSRELO

DOSRELO provides a method of making DOS program programs self-relocating. DOSRELO accomplishes the self-relocation capability for all programs, regardless of the language, by adding entry point logic to the object code of the program before the Linkage Editor catalog it on the Core Image Library.

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The Computer Installation Management System (CIMS) provides a method to supply management with pertinent information in the utilization of their data processing hardware. CIMS accepts data collected by the System Management Facility (SMF), formats the data and presents the data in varying sequence and formats. Reports for job accounting, multi-programming, throughput, hardware analysis, and others are provided.

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Random Notes

As Many as 1,000 Variables Modeled With GE's 'PA300'

BETHESDA, Md.—A probabilistic analysis program (PA300), just implemented on the General Electric remote-computing network, provides business managers with a modeling tool that evaluates all important parameters rather than just one best alternative.

PA300 is able to handle 1,000 variables, 500 of which can be probabilistic, a GE spokesman said. Minimum and maximum impact of variables can be determined. Both single and multivariate sensitivity analyses can be run.

'FDR' Enhanced to Dump 9 Disks Sequentially or Concurrently

FLANDERS, N.J.—Users of Version 1.4 of the Fast Dump Restore (FDR) package from Innovation Data Processing can handle serial dumping of from one to nine 2314-type disks in 65K in one OS job step. Concurrent dump of as many as nine disks can also be done in one OS job step, with an additional 60K needed for each additional concurrent operation, the company said.

Improved diagnostics pinpoint physical errors such as invalid VTDC information, invalid count fields and nonstandard zero records while dumping. The S99 FDR can be ordered through P.O. Drawer F, 14 Cloverhill Drive, 07836.

'Dmrs' Works With Data Bases

WALTHAM, Mass.—Subscribers of the First Data Corp. time-sharing service can now use the Data Management and Retrieval System (Dmrs) which features a report generator, a user-oriented command language and random access file processing. With Dmrs, users can define, modify, retrieve and update data bases.

Dmrs can search for items by comparing data base fields with numeric values, or with specified text strings on a complete match or a "contains string" basis. Dmrs may be used to create subfiles pertinent to a following application. First Data said from 400 Totten Pond Road, 02154.

'Dallas' Optimizes Circuits

DALLAS, Texas—The Modern Analytical Generator of Improved Circuits (MAGIC) general purpose electronic circuit optimization program, is now available through the Univac 1108 centers of the University Computing Co. time-sharing network.

Developed by Scientific System Technology, Inc., also of Dallas, MAGIC allows the user to specify a circuit and set of element values, after which the computer calculates the circuit responses. In optimization mode, the user also specifies the desired response and the system adjusts the elements to best meet that objective.

Staff, Tools, Approach

System Evaluation Must Be Planned

By Don Leavitt

SADDLE BROOK, N.J.—System performance evaluation has a definable dollar value, but who should do the evaluation and what tools should be used are questions each installation must answer for itself, David Vittek, manager of computer systems support for State Farm Insurance Co., said here recently.

His company saw a need for "home sort of measurement effort." Vittek said, as plans progressed to shift much of the policy inquiry and updating work from 25 "more or less independent" regional DP centers to a centralized site.

The shift involved a changeover from batch-oriented programs written in Autocoder and run on 360/30s and 40s in emulation mode, to pseudo-"real time" programs, largely in APL, to be run on 370/165, with 360/30s used as "intelligent terminals" out in the regional offices.

If present plans are completed, the 165s, located at corporate headquarters in Bloomington, Ill., will be linked together in a quadruplex configuration. The company also has a pair of 155s in Bloomington, for home office use, Vittek noted at a Boole & Babbage User Group meeting.

Faced with such a drastic change, State Farm began to explore all sorts of measurement tools—hardware and software monitors, simulators and program performance evaluators. A study indicated the company might save 8% of DP expenses/analysis/tool used and, perhaps ironically, it might be just one cost justifying two rather than just one analyst.

Two Measurement Teams

Following a well-structured strategy that moved from an original definition of

objectives, through a feasibility study and reports to management, into development and implementation of a measurement group, the company now has four types of tools and eight analysts divided into two teams.

Each of the team members has become strong in the use of a particular tool, but project leadership rotates among them to enhance all their skills. Normally one plans the project, another installs the proposed changes and a third evaluates the results. The fourth member adds his expertise where it will do the most good, Vittek said.

The technical support group, including the measurement teams, has the same status as programming and operations, and leaders of each group report to the same vice-president. There is therefore no built-in "clout" due to organizational position, Vittek noted, and recommendations have to be backed by strong evidence before they are considered.

State Farm uses a mix of packages and

devices from a range of vendors. The company acquired the Superson software monitor from the Cosmic clearinghouse, and the Paces package from Pace Applied Technology to extract and summarize statistics accumulated by IBM's SMP.

The company also uses two versions of Lambda's Efficiency Analysis Program (Leap) from Lambda Corp.—one geared to system analysis, and the other for individual programs and instructions within programs. Leap works well with "standard" PL/I programs, Vittek said, but is not too good with output from the PL/I Optimizing Compiler now available from IBM.

Applied Data Research's System Analysis Machine (Sam), actually a software package, has been used for simulation of proposed hardware configurations.

The teams have used IBM's System Measurement Instrument, and Xray from Test-data Corp., but have not yet made a final choice of hardware monitor.

'Data Analyzer' Gains Library And Linkage to 'Total' Files

NANUET, N.Y.—The Data Analyzer retrieval/reporting system from Program Products Inc. (PPI) has been enhanced by a procedure library feature which permits sets of user statements to be cataloged and accessed later through CALLs imbedded in other programs.

Stored procedures can include substitution parameters to be supplied in the CALL, and elements of the procedure can be included or omitted conditionally, PPI sources said.

The basic Data Analyzer can create bar graphs, histograms and cross-tabulations

without special programming. The package also provides the DOS or OS/360 user with computational capabilities for statistical functions, with table lookup and label writing support.

In addition to the procedure library feature, available without cost to all Data Analyzer installations, PPI is also introducing separately priced Data Base Interface Language (DBIL) which currently allows the user to link up with the Total data base management system from Cincom Systems, Cincinnati.

The interface makes its possible for Total users to retrieve information from any combination of data sets within a Total data base, and to combine a Total data base with any non-Total files, PPI claimed.

Defining a Total data base to the Data Analyzer is comparable to defining a standard file, the company said, with additional information needed to describe the relationships of data sets within the data base and record types within a variable entry file.

DBIL, providing a series of simplified commands, permits the user to define precisely the method of accessing a set of master or variable files for a particular application or set of applications.

The Data Analyzer uses a 40K partition under DOS/360, or a minimum of 80K under OS. The DBIL module will utilize between 10K and 15K additional bytes, depending on the size of the data base being handled, a spokesman said.

Data Analyzer costs \$15,000. The DBIL logic is available for \$4,000, from PPI at 20 Turnpike Road, 10954.

Module Shapes Expense Spread

SAN DIEGO, Calif.—An allocation module introduced by Infonational that distributes expense items throughout an organization can be used in stand-alone mode, though it is principally intended for use with the company's general ledger and report writer systems.

The module logic is customized at runtime for each usage and can be applied to a single expense, such as a telephone bill, or to the expenses of an entire cost center, such as corporate overhead. Infonational said. It is parameter-driven so the user defines the input, the target accounts to which it is to be distributed, and the priorities and percentages.

Used with the general ledger system, the allocation procedure would normally take place between the basic data gathering and the posting operations. Already designed to isolate "out-of-control" situa-

tions that need corrective action, the ledger system with the allocation logic added can pinpoint the bad situations even more precisely than before, the firm said.

The report writer system, like many others, is geared to helping the non-DP professional prepare his own reports. Again, the allocation logic of the new module would enable him to develop reports in more detail than would be possible with the undistributed data, Infonational said.

The allocation module functions under either DOS or OS/360 environments within 32K bytes of storage. It will operate along with available versions of Infonational's general ledger system, on the previous R2500/3500, Honeywell 200 and NCR Century 200 systems as well.

The new module is available for \$1,500, from 620 C St., 92101.

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DOS Mortgage Run Fits in 24K

DETROIT—Banks with a minimum 24K partitions under DOS can implement a full mortgage servicing and general ledger accounting system, including up to 60 periodic reports, with the Mortgage System (MS) software developed by Ft. Wayne Mortgage Co.

MS supports multi-branch operations and attacks what a Ft. Wayne spokesman called one of the prime expenses in mortgage banking—postage costs. The system generates books of payment coupons which are sent to mortgagors a year in advance, rather than producing individual monthly notices of payments due.

Delinquency notices are sent to mortgagors, and corresponding reports given the bank's collection department. If payments are not received when due, monthly reports to collection include a breakout of accounts that are 30-, 60- or 90-days overdue, the company noted.

18 Cash Reports

When payments are received, MS distributes the funds into principal repayment, interest and escrow accounts. Some 18 separate reports are produced daily to monitor the cash flow, the spokesman said. Money in escrow can be assigned to several purposes, even within a single mortgage account, he added.

The system generates payments of real estate taxes for each mortgagor, based on funds in his escrow account and on receipt of the tax bill from the relevant municipality. MS also notifies

the bank management when insurance renewals are required and can be adapted to generate premium payments, if the mortgagor has an escrow balance for that purpose.

In addition to reports for the mortgage and bank management, MS also produces reports in compliance with Federal National Mortgage Association regulations, the company said.

The package is written in Cobol and requires four disk drives in addition to the 24K bytes of memory. MS sells for \$7,500 including source code, program listings and user documentation. Expenses for on-site support by Ft. Wayne personnel must be paid by the purchaser, the company said.

Ft. Wayne Mortgage is in the First National Bldg., 48226.

Compiler Output Moved To DOS Relocatable Library

PINOLE, Calif.—DOS/360 users can catalog compiler output directly in the relocatable library without punching object decks, using tape drives or coding Job Control Language (JCL) statements, with the low-cost Catalr software now available from Marcus Power Associates (MPA).

The \$99 package eases modular programming, the company said, by enabling programmers to compile individual modules and then link-edit the entire program from the library. Modularity will become especially important as DOS operations are implemented in a virtual storage environment with demand paging, a spokesman noted.

The package operates in conjunction with any standard languages. It copies language translator output from Syslink to the relocatable library, which may be a 2311, 2314 or 3330 direct access storage device. Control cards may be placed in the card

reader or preceding the object code on disk.

The Catalr package runs in about 20 seconds in any DOS partition that supports link-editing. It accepts the standard DOS Catalr card, and a pair of additional parameters that provide backup and modification-level maintenance.

The new entries allow the user to tag an incoming module by date and version number so that proven modules cannot be inadvertently overwritten, for example, by a revision. Without this protection, the user would lose his backup in the event the new version was faulty, MPA said.

Catalr may be ordered in object form by sending a check or money order for \$99 to MPA, 2694 Doldge Ave., 94564. Source code and program logic will be available for an additional charge, the spokesman added.

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Foreground/Background 'In'

Nova 800 Jumbo Also Gets Shared Disk

SOUTHBORO, Mass. — A Real-Time Disk Operating System (RDOS) from Data General Corp. can allow users to run concurrent fully protected foreground and background tasks in each of the two processors that make up the Nova 800 Jumbo computer system.

The new software, scheduled for delivery next spring, also supports shared disk operations, the company said, so data might be collected in foreground, for example, and then immediately processed in a background operation.

No Interference

In the protected mode, neither foreground nor background user can interfere with the other or with the operating system. On-line applications such as communications or process control can be run in the foreground while computations, report generation or program development tasks are being handled in the background.

With the disk software, which Data General considers a multiprocessing/multiprogramming package, both data and programs can be shared by the two processors. There is, therefore, no need to

maintain separate libraries and use of disk space can be optimized.

Backup System

The system also eliminates the need for separate peripherals for each processor, the company noted, and, from a different perspective, includes a built-in backup computer if a malfunction occurs on either one.

RDOS also supports expanded memories with up to 128K words of core available in each of the processors. The addressing mechanism allows dynamic allocation of up to 31K words of memory to either or both the foreground and background users, and protection of RDOS-controlled peripherals against inadvertent addressing by user programs.

To function, RDOS requires installation of the hardware memory management subsystem which is mounted on a single printed circuit board. It costs \$3,500 and will be available in the spring.

RDOS itself will be distributed free, Data General said from corporate headquarters on Route 9, 01772.

GA Package Includes Improved Fortran IV

ANAHEIM, Calif. — Under the Real Time Operating System (RTOS-16), newly available from General Automation Inc. (GA) the company's SPC-16 mini-computer will execute scheduled and interactive programs in a foreground mode concurrent with operation of batch programs in the background.

This means, the company said, that a user could be running time-shared Basic work while simultaneously compiling, editing, debugging or executing Fortran programs, utilizing system resources that might otherwise be idle.

RTOS-16 will run on any SPC-16 configuration, including the smallest one allowable for program generation: 16K of memory, a disk unit and a teletypewriter.

GA's multi-user Basic is described as a complete implementation of standard Dartmouth Basic, including matrix, alphanumeric strings and file-handling capabilities.

An extended version of ANS Fortran IV is also available, incorporating additional features to make more efficient use of the mini's capabilities with few if any changes in programs being transferred from earlier GA operating systems or from other machines.

RTOS-16 is being distributed free to current and future users of the SPC-16 minis, GA said from 1055 S.E. St., 92805.

Varitek Software Drives Process Control PDP-11s

BEDFORD, Mass. — Data acquisition operations can be handled in a multitasking environment on DEC PDP-11 equipment with the DOS-11 package from Varitek Computer Systems Inc. Used in conjunction with DEC's standard DOS-11, the new software allows concurrent execution of many foreground tasks along with a single background task.

The foreground tasks are normally event-driven routines working from sensors or other acquisition equipment. The background task supports a control terminal utilizing a command language identical to the one supplied by DEC for single-tasking operations.

Both foreground and background tasks have full file-handling capabilities available on both file-structured and non-file-structured devices. The foreground tasks have file access but no terminal access in the present implementation, Varitek said.

In effect, this means that data captured by each of the foreground tasks can be posted to individual files or other data structures even though no processing is done at the time of acquisition.

DOS-M is available for \$3,500, from 1 deAngelo Drive, 01730.



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Communications Interface Added to OCR Scanner

MOORESTOWN, N.J. — Orbital Systems Inc. has added a communications interface to its Orbit2/OCR scanner. The scanner can read handprinted characters, pencil marks or punched holes, and with the interface can transmit the scanned data at 110, 300, or 1,200 bit/sec. The communications capability turns the scanner into a source data-entry terminal, the company said.

The interface can be added to installed units for \$700. The complete scanner with interface costs \$2,495 from Church & Fellowship Roads, 08057.

Modem Replaces Bell 103F

SUNNYVALE, Calif. — Anderson Jacobson Inc. has an L184/12 modem to directly replace the Bell 103F data set. The unit operates in the answer mode over 2-wire private lines and interfaces with standard RS 232-C type terminals.

Pushbutton switches allow testing of the equipment and the line. Unlike the Bell data set, the independent unit provides both half- and full-duplex transmission. The modem costs \$190 or \$9/mo with first deliveries scheduled for early 1973. The company is at 1065 Morse Ave., 94086.

Portable Unit Has ASCII

NEW HAVEN, Conn. — Mite Corp. offers a portable data terminal that can operate at 10- or 15 char./sec over a dial-up line using an acoustically coupled phone.

The device can generate the full 128-character ASCII set and print 64 characters. The unit includes an impact printer that can handle up to six-part forms. Called the 150T, the terminal costs \$2,100 from 446 Blake St., 06515.

NCR Adds Cassettes

DAYTON, Ohio — NCR has added a cassette capability to its thermal printing terminal. Called the 260-6, the unit includes a cassette storage of 2,000 80-character blocks and operates at 300 word/min.

Messages can be keyed in, stored on cassettes and left for later dial-up polling by a central CPU, NCR said. The terminal costs \$150/mo with first deliveries in June.

Communications Meeting Planned

SAN JOSE, Calif. — The second annual Computer Communications Conference at California State University (CSU), scheduled Jan. 24 and 25, will explore the communications aspects of time-sharing systems.

Information is available from Dr. E.K. Shaw, 125 S. Seventh St., 94303.

User Benefits Seen

Access Methods Could Reside in VS

By Ronald A. Frank

Of the CW Staff

WHITE PLAINS, N.Y. — The addition of virtual-storage concepts will give the microprocessing (TP) user increased operational flexibility. Robert M. King, IBM's product manager for large systems, told *Computerworld* in a recent interview.

Such an addition to a communications system may mean that the user can move his TP access method such as Stam, Qam, etc. out of main storage and into his virtual environment, King said. "If you are going to page your TP access method in and out, you are going to have to pay a penalty of paging. But if that gets to be an intolerable situation, the system can freeze all of the TP access method in memory."

Less Dedication

For the low-volume TP user, virtual storage might make the difference between having a communications capability and not being able to handle this type of job, King said. "It will be easier to justify the low-volume application because less of the system will have to be dedicated to it be added."

With the TP access residing in virtual storage instead of main memory, the access methods might well become more sophisticated and detailed, but this is strictly conjecture at this point, King said. "As the data processing community begins to exploit virtual storage with its techniques, this type of development certainly becomes possible," he said.

"The remote user has always been subject to the applications programs that exist at the central site. And since virtual storage allows these applications to be more completely implemented, the remote user will get better service," he said. And the central site will be able to offer these increased capabilities without disrupting normal operations, King predicted.

More Complete Implementation

Thus, one of the biggest advantages for the remote TP user lies in the possibility of more complete implementation of the applications and in being able to run unusual jobs that previously may not have had sufficient priority in a more conventional communications environment.

"Now the engineer who once a year runs a 500-by-500 matrix inversion and needs a 2 Mbyte region, can get it," King said. This type of remote user previously could not get on the system because of fixed-size partitions, and the fact that no one at the central site could justify the expense of setting this up on a low-volume basis, he explained.

Additional Channels

But increased central-site capabilities may require additional network capabilities, he said. While a virtual system may be able to handle a larger number of TP jobs, additional channel and I/O capabilities might have to be included by the user, he said.

By managing smaller portions of his program (pages) rather than regions, the user will be able to perform "deeper" multiprogramming and handle more online tasks in the CPU concurrently, King said.

Testing Easier

The testing of new applications programs for an on-line system will be easier in a virtual-storage environment, King said. As an example, a 512K 145 could be used to test programs that would later be run on a 2 Mbyte 165. The entire application could be tested on the 145 even though the performance on the smaller system might not be equal, he said.

And since the virtual environment "is more dynamic, the user can get more frequent test shots," King said.

Most large users that convert to virtual-storage capability will already have some TP operations, King said. And these systems will be enhanced with the increased flexibility which the new operating systems provide, he said. This in turn will make it easier to expand the communications functions, he said.

As a final point, King said virtual systems used in on-line applications provide the user with easier backup since small systems (512K) can be made to "look like" large systems (2 Mbytes) — making it less of a problem to switch a different system into the network. But such a switch to an alternate mainframe would still require a manual switchover, he said.

Turnkey Teleswitcher Runs Message Network

MILWAUKEE — Although a store-and-forward message-switching system usually requires customized software, some users will get this capability on a turnkey basis.

For a company without extensive in-house capability configuring a message-switching network can be a real problem. One firm solved this problem by selecting a turnkey system.

Loewi & Co. Inc., an investment banking firm, serves its customers by entering large volumes of orders direct to the floors of various stock exchanges. To handle the 47 teletypewriters used by the firm's customers, Loewi installed a Teleswitcher system from Computer Control Systems Inc. (CCS).

First Things First

The Teleswitcher acts as a controller for the TTYS and assigns priority status to messages determining in what order they will be sent. Before installing its own Loewi depended on a store-and-forward system operated by a correspondent broker, according to Terry Watts, manager of order processing.

Whenever a part of the system went down, Loewi would have to arrange for maintenance through the correspondent which controlled the system, Watts said.

With the in-house Teleswitcher, the company has "complete control," Watts said.

To Floor in Minute

The company uses Model 28 TTYS, according to Treasurer Bill Sullivan. With the Teleswitcher and 83 lines from the telephone company, messages can be transmitted to the floor of an exchange in less than a minute, Sullivan said. The messages are transmitted at 100 word/min using 15 half-duplex teletypewriter circuits. Each message is in contention for available circuits depending on priority.

At present the Teleswitcher store-and-forward system is self-contained. The company also has a 360/30 which could be connected on-line to the Teleswitcher. But any administrative data that is accumulated by the front end is key-punched and entered off-line into the mainframe. If the company decides to connect the two processors, CCS can provide that capability on a turnkey

basis, Sullivan said.

The complete Teleswitcher installation cost the company about \$100,000, according to Watts. Because Loewi needed the configuration of the system in-house and also achieved closer control over its order-entry system, the firm feels it was worth the cost, Watts said.

Custom Job

The Teleswitcher is based on a DEC FDP-8 which is customized with software and the necessary peripherals to operate in the Loewi network. The firm considered two other front ends, according to Watts, and based on the two-year rental costs of the other systems, it was decided the company would be better off buying its Teleswitcher.

Although used primarily to execute buy-and-sell orders, for securities received from branch offices, the Teleswitcher system also transmits sales messages and handles administrative traffic between Loewi offices. The front end maintains a log of all messages and also provides management with reports and trends of network activities.

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'Our Service Offerings Based On Needs of Users': MCI

By Ronald A. Frank
Of the CW staff

CHICAGO — "All our service offerings are based on the specific needs of users and we are always looking for additional input from our customers."

This is how John Goeken, president of MCI Communications Corp., reviewed the first year's operations of MCI at an anniversary meeting for 16 of the new carrier's initial users.

Tracing the long regulatory fight to begin service, Goeken said most of the 21 different digital channel bandwidths now available between Chicago and St. Louis were selected based on user's needs. He cited one large publishing company which wanted to transmit data in one direction to its regional printing plants. "This is what led us to offer one-way service," Goeken said.

The specialized carrier will begin to serve users between Chicago and New York in July 1973, according to John DiGregorio, MCI national account representative. About 51 tower sites have to be constructed along the New York route and almost half of these are already in place, DiGregorio said.

The equipment at each site is being preassembled in Dallas and each tower building and its equipment are transported into place either by truck or by helicopter, he said.

In addition to New York, MCI will inaugurate service to Philadelphia, Cleveland, Pittsburgh, Toledo, Detroit and Akron by the middle of 1973, according to Carl Voder Bruegge, senior vice-president.

By the end of the year service will be added in Baltimore, Washington, Minneapolis, Milwaukee, Dallas and Fort Worth, he said. And West Coast cities including Los Angeles and San Francisco will have MCI facilities in the first quarter

of 1974, Voder Bruegge estimated. In 1975, MCI plans to begin service, DiGregorio said. The of this service for users will be one-to-many capability with single transmission to reach



John Goeken, MCI president, addresses users.

locations simultaneously. A satellite service will not be available, he said.

Elaborating on the satellite service, Buchanan, president of MCI Corp., said FCC approval soon for a joint undertaking with Spacecom may be forthcoming. If approval is granted, a new service called Spacecom will be added to terrestrial communications links, users will probably take time pretty much for granted, he said. "The user is interested in his application. The end result is transmitted regardless of how the transmission is made," he said.

An MCI user group formed in the past few months to discuss try lines may be one result of the meeting, according to an MCI spokesman. Although the company is advocating such a group, it will support it if initiated by users, he said.

Although the company is advocating such a group, it will support it if initiated by users, he said.

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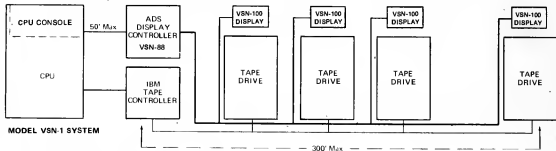
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ADVANCED DIGITAL SYSTEMS, INC.
MOHAWK, NEW YORK 13407

The ADS Volume Serial Number Display (VSN Display), operating under OS control, tells the operator the 6-digit Volume Serial Number of a tape reel to be mounted. The VSN Display attaches to the Operator's Panel of any IBM Model 2420 or 3420 Magnetic Tape Drive or equivalent.

When a Mount Message occurs, a push-button indicator on the VSN Display flashes to attract the operator's attention. Simultaneously, the Volume Serial Number of the tape reel to be mounted on that drive is indicated by the display. The indicator will flash until the operator depresses the push-button light.

As illustrated, all displays are connected to an ADS-supplied controller, which in turn is directly hard-wired to the IBM Computer Console channel bus.



INSTALLATION AND MAINTENANCE

The VSN displays and controller can be installed in one day, by factory-trained personnel. Cable is routed under the raised floor from the VSN system controller to the tape drive and externally up the back of the drive along the hinged side of the swing-out access door. A separate hardware maintenance contract is available from ADS on a time and material basis.

ADVANTAGES

- Reduces human error by providing a more positive identification of the tapes to be mounted.
- Eliminates the need for a console printer or equivalent in the tape drive area just for displaying Mount Messages.
- Eliminates voice communications between the CPU console operator and the tape drive area.
- Improves operator response time to tape mounts.
- Allows the operator to carry more tapes for faster servicing of tape drives.
- Reduces computer room noise and confusion.

DISPLAY CHARACTER SIZE

Model	Description	Character Height
VSN-100	6 Character Numeric	0.75"
VSN-300	6 Character Alphanumeric	0.75"
VSN-400	16 Character Alphanumeric	0.75"
VSN-88	Display Controller (includes console connection capable of driving up to 64 displays)	0.4"

NOTE: 6, 16 and 32 alphanumeric character displays are also available for interfacing with other CPU main frames and minicomputers. The flashing light will extinguish automatically when the tape mount is satisfied, provided a communication interface controller Model VSN-99 is used.

A typical VSN system serving 8 tape drives, consisting of 8 VSN-100 displays and one (1) VSN-88 Controller, is presently priced at \$166 per month or a purchase value of \$4,960.

Advanced Digital Systems, Inc.
Marketing Dept.
Mohawk, N. Y. 13407

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Access Bank Data Bases

Portable Terminals Replace TTYs

NEWTON, Mass. — The use of portable terminals for data retrieval is growing within the banking industry. Many banks are acquiring portable units as replacements for the more bulky, less flexible teletypewriter.

The portable terminals used by banks fall into two categories: those that remain in-house and are useful for the standpoint of mobility and those taken outside by bank personnel. The latter type provides remote access to the bank's mainframe system wherever a phone can be acoustically coupled to a portable terminal.

The Chemical Bank in New York has established transatlantic data links with portable terminals accessing data bases in Cleveland on the GE time-sharing system. The bank uses Execuport terminals from Computer Transceiver Systems Inc. They are connected to U.S. CPUs from various sites in Western Europe including the UK, France and Germany, according to Ruth Wallstead, a senior consultant for financial studies at Chemical Bank.

The bank has developed corporate forecasting packages which are maintained on the GE system. The packages are designed to complement local accounting practices used by corporations in Europe. The data models on which the forecasts are based are stored on the GE CPUs in Cleveland. With the portable terminal, a Chemical Bank representative can produce projected income statements, balance sheets and other financial reports for a prospective client in Europe.

Own Data Base

The bank has developed the software for the corporate forecasts and GE provides the line facilities and the CPU power to generate the results. "To make your assumptions to derive your financial reports you have to create your own data base," Wallstead said. The use of the data models for forecasting purposes is leased to corporations by the bank, she explained.

The Execuport terminal has been used for financial demonstrations both in this country and abroad and the only problems have occurred in the U.S. in areas served by independent phone companies, she said. The portable terminal originally was not set up to handle non-Western. Electric telephones, but this problem has now been solved with an adapter, she added.

"With some customers, the immediate financial printout generated with the portable terminal is 'the selling point,'" Wallstead said. "They want to see it in action."

IDCMA Approves AT&T Protection Proposal

WASHINGTON, D.C. — AT&T's plan for protection of private lines (CW, Nov. 21) using non-carrier equipment has drawn a "conditional" approval from the Independent Data Communications Manufacturers Association (IDCMA). In a letter to the FCC, Arthur Carr, IDCMA vice-president, said the association would not oppose the proposal with the understanding that "protective devices are an interim approach that will not prejudice" any future certification program.

The only proper approach for a final solution to the interconnection question is one in which the user may utilize carrier or customer-provided equipment with the same line service," Carr said.

IDCMA is approving the AT&T plan with the understanding that the carrier will not "engineer" private lines with the proposed protective measures in such a way that they make it more difficult for the installation of independent data equipment, the letter said.

Private line protection is "an interim solution" pending settlement of interconnection issues before the FCC, Carr said.

Another bank which utilizes portable terminals, but for a different purpose is the Beverly Bancorporation in Chicago. The bank currently has about 60 terminals connected to an IBM 370/145 which is used to retrieve loan account data and similar day-to-day operations within the bank, according to Dino Kapadia, manager of research and planning.

Less Connect Time

A recent survey by Kapadia's department showed the Texas Instrument portable 720 terminals had about 36% less CPU connect time per month than another bank which was using teletypewriters.

The main reason for the increased efficiency, according to Kapadia, was the faster 30 char./sec transmissions on the TI portable terminals compared with the 10 char./sec on the Model 33 TTYs. Two banks with similar operating procedures were compared for the survey, he said.

From a practical standpoint, Beverly Bancorporation likes the portable units because they are easy to shift around among workers as needed.

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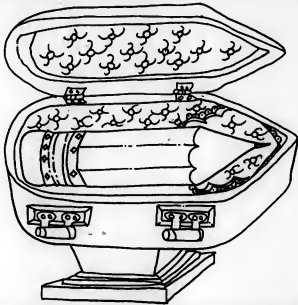
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SYSTEMS & PERIPHERALS

Bits & Pieces

IBM Users Offered Add-On Memories for Large 360s

WAPPINGER FALLS, N.Y. — IBM System 360/65, 360/75 and 360/67 users now have new add-on or replacement memory, according to the developer, International Corp.

The Series 70 memory system provides 256K to 1,024K bytes of 750-nsec memory and up to 4M bytes attachable to an IBM 360/65 the firm stated.

The system features a built-in off-line test unit and an all-modular construction including plug-in boards for both memory and logic.

Successful installation of the Series 70 has already been accomplished, a spokesman noted.

Prices for add-on start at \$84,000 for the 256K unit and increase to \$198,000 for the 1M-byte unit.

A lease plan is available and service is through Comma Corp. Delivery is within 60 days from Market St., 12590.

Camera Captures CRT Images

MAHWAH, N.J. — For users who need to take high-resolution photographs of terminal-display images Celco offers the COF/EIC Camera Display System.

The camera system — with a basic price of \$7,500 — is self-contained and attaches directly to the front of the CRT. The camera is electronically controlled and includes a through-the-lens light-metering system. Light transmitted through a film negative can also be detected by the optical-scanning beam.

Standard models I, II and III — 16mm, 1,000 TV lines; 35mm, 2,000 TV lines; 70mm, 4,000 TV lines — are available. Custom systems require six months for delivery from 70 Constantine Dr., 07430.

Sprinkler Turns Off After Fire

PROVIDENCE, R.I. — A sprinkler head is designed to automatically shut off after extinguishing a fire, according to a spokesman for Grinnell Fire Protection Systems. The Aquamatic operates by means of a heat-sensitive disk in the sprinkler with each head operating independently so water is directed only at the point of the fire, the spokesman stated.

Typical computer room installation of the Aquamatic system costs about \$1 per square foot, from 10 Dorance St., 02903.

Unit Aids Headline Writers

MIDLAND PARK, N.J. — A computerized character counter which will provide a readout of character units to 1/100th of a pic is available for headline writers from Terminal Equipment Corp. The Kara-Kount consists of an IBM Selectric equipped with a Holmer-Tycom transmit-only applicator and a digital computer, and costs \$2,960 from 214 Franklin Ave. 07432.

Links PDP-11, PDP-15

DEC Offers Dual-Processor System

By Michael Weinstein

Or the CW staff
MAYNARD, Mass. — Digital Equipment Corp. has taken its medium-size PDP-15, connected it to a PDP-11 through a multiplexer and the Unibus and can use with the PDP-15/76 dual-processor system.

The design objective of this system is to have the larger PDP-15 perform the large processing tasks while the PDP-11 handles administrative and peripheral tasks, a DEC spokesman stated.

A further advantage to DEC users, he stated, is that the PDP-11 has more compatible peripheral devices so the 15/76 system can be configured in more user-oriented versions.

Also unveiled with the new system is the RK15 disk cartridge system enabling present PDP-15 users to upgrade to the 15/76.

Second Processor

The heart of the new system is the Unibus — part of the basic PDP-11 configuration — which provides the PDP-15 with a second general-purpose processor and a second high-speed I/O data transfer bus.

The standard unit is an 18-bit data pathway permitting transfer of 18-bit PDP-15 words, the spokesman stated, in addition to 16-bit PDP-11 words or two 8-bit bytes.

With the Unibus is a memory multi-

plexer, designed to emulate byte operation in the PDP-15 memory so memory is usable for PDP-11 programs, and to enable byte-oriented devices to make data transfers directly to the common memory in the PDP-15.

The RK15 consists of the Unibus-channel 15 peripheral processor — a PDP-11/05 with 4K 16-bit words of core memory, a



PDP-15/76 performs full parallel processing.

memory multiplexer enabling the PDP-11 and PDP-15 to share the 18-bit core memory of the 15 and an interrupt link for interprocessor communications — a disk memory controller and 12M-word disk drive.

The PDP-15 portion of the system in-

cludes paper tape reader, 16K words of core memory and magnetic tape unit.

Three Operating Systems

Three software operating systems are offered with the PDP-15/76 including DOS-15 — a disk operating system; BOS-15 — a batch-operating system; and RSX-plus — a real-time resource-sharing executive.

Prices for the 15/76 start at \$64,300 with the RK15 costing \$18,900. First deliveries are set for March.

PGI Interfaces 844 Disk System With HIS Units

CHERRY HILL, N.J. — Users of Honeywell models 400, 600 and 6000 processors can now interface with the PGI 844 Disk System through a new model of the 844 Universal Controller from Peripherals General Inc. (PGI).

The 844-1 Controller connects directly to the CPU operating as a replacement for GE DSS 160 or 180 Series removable storage subsystems, the firm stated.

Standard and Double Density

Two disk drive models are offered: a standard density unit with storage capacity of 31.2M char./spindle; and a double-density unit.

A nine spindle 741 system has a capacity around 250M char. The same configuration using 742 drives stores near 500M char., a spokesman stated.

Access time is seven msec track to track, with an average random-access time of 29 msec.

A typical five-spindle system with Honeywell interface leases for \$2,500/mo on a two-year lease. This compares with \$3,300/mo for the standard Honeywell units, the spokesman said.

Delivery is 60 days from Cherry Hill Industrial Park, 08003.



PGI disk subsystem connects directly to Honeywell CPU.

Lower-Cost Units Added to Line Of Tape and Cassette Equipment

WALTHAM, Mass. — Kybe Corp. has beefed up the low end of its line of cassette tape products and management systems with a tape-management system, a cassette reader and separate writer and a line of cassette tape.

The TMS-77 is the third and lowest-priced of Kybe's tape management systems combining the functions of com-



TMS-77 is designed for the small-to medium-sized user with simple testing requirements.

puter magnetic tape testing, cleaning and precision winding, a firm spokesman said. Innovations include an electronic motion control that eliminates "cinching" in the tape reel and a digital printout device for presenting test results, the spokesman stated.

The Ky-reader and Ky-writer are additions to the firm's line of cassette tape systems, operationally acting like a paper tape reader or paper tape punch, respectively.

Industrial Applications

These units are especially designed for users in the areas of numerical control, data logging and industrial applications, the spokesman said.

Kysette Red Label is called a lower-priced cassette tape for the user who does not need the superior performance of premium lines.

Unit cost of the TMS-77 ranges from \$6,200 to \$6,800. Prices for the Ky-reader and Ky-writer range from \$2,200 to \$2,600 in single units. Cost of the Kysette Red Label is \$4.75 in 100-unit quantities.

The firm is at 132 Calvary St., 02154.

We show a history of making the printers that make money for EDP centers through off-line printing. You should see our System/4000 Satellite Printer do it. It interleaves mainframe print formal instructions, and processes 7- and 9-track tapes of from 200 to 1600 bpi densities at up to 1340 lpm. Get the System/4000 with a FACT controller to handle multiple-format programs and data labels. Get it with an ACT controller to translate vertical-format and data-character sets from magnetic tape codes to printer action codes. Getting the just-right Satellite can be a profitable experience. Especially since we can beat any competitor's price. So get in touch.

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"TSM"—for Total Systems Measurement—is a new process in performance measurement technology. The Dynaprobe-8000/TSM Option means, in effect, the measurement of all basic host systems activity *simultaneously*. With one set of sensor probe attachments at the central processor.

TSM has been under development at COMRESS for several months to overcome a major technical/economic problem facing the hardware monitoring industry: the reliance on the electronic hardware counter as the basic method of data capture.

THE PROBLEM: In the traditional approach, a high-speed hardware counter is connected to the host system for each function to be measured.

If, for example, you wanted to measure "device (disk) busy", you would attach a small electronic sensing device called a "probe" to the disk unit itself, and the device busy signals would be physically read into the hardware counter.

The number of direct, simultaneous measurements you would be able to take would be limited to the number of hardware counters in the monitor—generally 16 to 32.

To get some idea of the severity of this limitation, take a typical 360/50 installation: to measure all concurrent

1000 measurements simultaneously.

CPU, channel and device activity—*by program*—you would need somewhere between 400 and 500 hardware counters. Or an investment approaching one-half million dollars in measurement equipment. For larger systems, the counter requirement could easily exceed 1000. Obviously, this investment is not feasible. There had to be a better way.

THE SOLUTION: The TSM Process captures all measurement data at the central processor—including device and channel identification—time-stamps it, and sends it through a high-speed buffer to the D-8011 Mini-Computer. The mini keeps track of what's going on and calculates all activity with nanosecond precision. This makes it possible to measure thousands of system functions simultaneously. It also eliminates all but one *standard* set of sensor probe attachments—an enormous simplification over the earlier method.

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Utility Augments Disk System With COM

HOUSTON — The Houston Lighting & Power Co. is using a microfilm retrieval system to replace nine million pages of computer printout, save space, provide better customer service and reduce costs by two thirds, according to O. C. Hennessey, manager of operational research.

The need for something better became evident when customers would call and ask for information on previous bills. "It took an uncomfortably long time to put the customer on hold, call another department, wait for them to locate records in binders along 140 feet of counters, write down the information and then

relay it back to the customer waiting on the phone," he continued.

To illustrate the scope of the problem, Hennessey said the company receives about 100,000 calls a month from customers wanting to know specific information on their utility bills. Of these, about 10,000 cannot be answered using on-line terminals connected to the firm's two IBM 370/165s.

'Horrendous' Amount

The amount of 3330 disk space required to keep a minimal amount of information about customers is "horrendous," he

continued.

"We keep on-line information on the last two months of power usage, bill and previous balance by customer, but most inquiries are of a special nature, such as those concerning a customer who moved."

With Varian Microfiche Retrieval/Display units, "we are able to visually display a complete history of any customer within 15 seconds of his call," he stated.

Besides providing better customer service, the microfiche system has ended the paper flood and is about "one-third as expensive as the paper record-

keeping method — each Varian microfiche reader costs about \$2,500."

Another advantage cited is that it previously took seven hours for an employee to buy, sort and file the paper output, while the microfiche now is available every day at 9 a.m.

Also four printers were kept busy 24 hours a day just producing the paper records. With microfiche the need for impact printers is reduced by more than one-half, Hennessey stated.

\$245 Camera Unit Yields Hard Copy From CRT Images

SAN DIEGO — Users with an occasional need to produce hard copy from the screens of video display terminals are offered a \$245 unit from Integrated Controls.

Built around a Polaroid camera and light-screening hood, the Scope-Mate is designed for users not able to justify paying \$3,000 to \$4,000 for a facsimile device, the firm's spokesman stated.

The hood fits over the display screen with the hand-held camera to produce 3-1/4 in. by 4-1/4 in. black-and-white or color photos in about 15 seconds, the spokesman said.

One camera-hood unit can be used with several terminals — moving from one to the other as the need arises — without additional equipment costs, the spokesman said.

The Scope-Mate has the same operating specifications as Polaroid's CU5, the spokesman commented, but costs \$100 less.

The purchase price of the camera unit comes to about one month's rental fee for the typical facsimile unit, he said.

The firm is at 3045 Moore St., 92110.



Scope-Mate camera can be moved from terminal to terminal.

Textile Dyeing Lives

FOXBORO, Mass. — A computer-directed system to control textile dyeing operations has been introduced by Foxboro Co.

The Dye Control System simultaneously controls any combination of up to 30 dye machines. Machines controlled can be atmospheric pressure, jet, beam, package and package or beam with flow control.

Depending on applications, the system will justify itself economically with as few as eight machines, according to the firm. Foxboro provides documentation, start-up assistance, maintenance and service support with a typical system costing about \$150,000.

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Backup System Provides Non-Stop Power

MAHWAH, N.J. — Abex Corp. wanted to operate its IBM System 7 for an application that required continuous operation — day and night, seven days a week; but it first had to solve some costly and unforeseen power problems by installing its own power back-up system.

When the project was first started, it was felt that if electrical power was lost four times a year, the company could tolerate it, said Tim Flanagan, engineer in charge of tests at Abex's research center.

When operation began, line problems were causing the machine to crash not four times a year, but several times a week.

Each time the System 7 crashed, memory was totally lost. Lengthy programs were lost in execution.

Armed with the records of frequent outages, Flanagan and Herb Lloyd, research center manager, paid a visit to the local utility company to compare records.

Lloyd asked for records on local power outages over the previous year and asked what the utility expected for the future.

He was surprised to find that the utility company only counted outages when systems were "down" 15 minutes or more, Lloyd explained.

"At this point," Flanagan said, "we decided to invest in our own power supply system — something we could install at a cost of less than 1/10th that of the computer and yet have as its primary responsibility the maintenance and continuous power support to the system, regardless of transients, spikes or out-and-out power failures on the line." A five-break-up uninterruptible power supply (UPS) system from Gould Inc. was recom-

mended and installed. Heart of the installation is a static inverter — used as one component in an overall standby power system consisting of a charger, a battery bank and the inverter.

The inverter carries the computer's electrical load at all times, regardless of whether problems exist or not. Under normal circumstances, the charger provides the input current to the inverter plus floating the battery bank or recharging it as necessary. The charger in turn is run from the standard AC line.

In the event of failure to the commercial AC line, the inverter continues to run on the battery for a 20 minute emergency operation time. This is adequate to allow for an orderly shutdown of the system with no memory loss, Flanagan stated.

In this mode of operation, as long as the charger is functioning properly, there is no drain on the batteries. Input current for the inverter is derived from the charger and does not flow through the battery.

Within the inverter, the oscillator provides the basic frequency (60 Hz $\pm$ 0.5%) adjustable by a variable resistance control.

Standard Invert-ostat frequency is 60 Hz (50 Hz units can be supplied). By synchronizing the oscillator to an external signal or to those of other units, line synchronization can be obtained.

Inverters of the same rating may be added by utilizing a paralleling logic circuit, Flanagan said.

The SCR unit operates as a switching circuit with the silicon-controlled rectifiers triggered alternatively by the oscillator square wave output. Output of the inverter is another square wave with amplitude directly proportional to the input DC

voltage.

This is a standard circuit to which modifications have been made to provide more reliable commutation and important protective features for elimination of high transients and component burnout.

The regulating filter is a ferromagnetic device which converts the square wave into a sine wave of low harmonic content (normally 5%) and regulates the voltage output (normally $\pm$ 3%), and also provides overload and short-circuit protection.

"With the turnkey UPS system we're now using," Flanagan concluded, "we have more fail-safe performance. And transient protection — something we were never able to identify as a problem simply because we didn't have the monitoring equipment — is a solid bonus."

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The 10 city 1973 Computerworld Caravan tour will feature the popular Centronics dot matrix serial impact line printers with speeds of 100 to 330 characters per second and 60 to 200 lines per minute. The recently introduced Model 306 printer, priced at \$1,995, will be one of the highlighted products. The low cost Centronics Model 401 keyboard terminal will also be prominently shown in the Caravan. The 401 allows keyboard controlled data entry, editing and communications capabilities for system on-line and off-line operations. A wide variety of popular communications and computer interfaces are available to meet most system requirements.

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PL/I Made More Useful Teaching Tool; 'Pluto' Speeds Compilation Process

As supplied by the manufacturer, PL/I is not economical for the university environment, due to lengthy compilation times. A teaching-oriented compiler must emphasize compilation speed, at the expense of execution speed. The University of Toronto has designed Pluto, a fast in-core PL/I compiler with a highly diagnostic interpreter for teaching most of the programming techniques possible with PL/I.

Tests comparing Pluto with PL/C showed they compile at similar rates, even though Pluto supports full PL/I while PL/C supports only a subset. The Pluto compiler is a single pass (i.e., statement-at-a-time) high-speed compiler which translates from the PL/I source language to a pseudo-machine language. It consists of a number of reentrant modules.



J. Daniel Couger
On
Education

The pseudo-machine instruction set is large and includes some very powerful instructions. It provides not only for the computations required by Pluto, but also includes instructions which manipulate and control program flow and status information to allow extensive run-time diagnostic reporting.

The instructions are in three basic formats—single word, double word and multiple word. Most computational instructions have two operands—source and target/source, while I/O and other multiple-word instructions reference a variable number of operands (with an extremely large upper limit).

Performance of Pluto

The Pluto system (version 1) is now installed at the University of Toronto Computer Center and has been in use since September 1971.

The experience with the first-year course demonstrated the advantages of the Pluto system and provided an opportunity to make a number of realistic performance measurements. The existence of formal BNF grammars for the syntax has been welcomed by the lecturers, either as a vehicle for original teaching of the language syntax or as backup to resolve syntactic details if a more conventional descriptive approach is taken in the lectures.

A main advantage is the diagnostic capability provided by the compiler/interpreter approach. The error messages are produced in-line wherever possible, and explicitly refer to context of the error, giving hints as to possible causes for this error where appropriate. Even more impressive is the information provided for execution time errors.

All possible information is given as to what variable is unassigned, whether there are other variables of different scope with the same name (namesakes), how the variable was originally declared and how control reached the statement where the error occurred.

Pluto execution speed is slow. However, it is quite acceptable for a student environment, and far exceeds the speeds normally associated with fully interpretive systems.

With the compiler and interpreter operating in an overlay mode, 150K of core provides adequate object space for student programs (Pluto object code is typically 1.5 times the size of code generated by PL/I-F for the same program). A detailed description of Pluto was prepared for the June 1972, issue of *Infor* by P.J.P. Boulton and D.L. Jeane of the University of Toronto. The publication is available from P.O. Box 2225, Station D, Ottawa, Ontario.

Couger is professor of computer and management science at the University of Colorado.

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ASM Film Catalog Aids User Training

CLEVELAND, Ohio—The *Systems Film Catalog*, published by the Association for Systems Management (ASM), lists nearly 150 films, from many sources, that could be used in conjunction with a user's training program.

The 60-page booklet divides the 16mm films into technical areas including basic DP concepts, flowcharting, systems applications and forms design. More general topics, ranging from "communications" and human relations, through management and work measurement and improvement, are also covered, ASM noted.

The catalog describes the contents of each film, its running time and whether it is in color or black-and-white. The sources and rental fees are also given, but a foreword warns users that the fees may not be current by the time they want to use a particular film.

The \$2 booklet is available from ASM headquarters, 24587 Bagley Road, 44138.

COMPUTER INDUSTRY

2 More Good Years Seen

'72 Mainframe Shipments Top \$9 Billion

CI Notes

Scan-Data, Inforex Kill Merger Plans

NORRISTOWN, Pa. — Scan-Data and Inforex have canceled their previously announced plans to merge in order to form a data-entry company.

Scan-Data said the agreement was ended because "certain previously expected advantages of our combination now don't appear attainable."

The firms said they intend to resume discussions regarding possible OEM product purchase arrangements which had begun prior to the agreement in principle reached in December.

Unicom Shakeout Victim

EL MONTE, Calif. The shakeout in the mini business has claimed the Unicom subsidiary of Hoffman Electronics Corp.

The subsidiary, founded in mid-1969, has never been profitable, according to Dr. Wendell B. Sell, Hoffman president. Originally Hoffman was a 31% investor in the firm, but took over 100% control two years ago.

"The competitive environment in the minicomputer field is so intense that we see no point in making the substantial investment required to penetrate that market," Sell said.

Amplex Lands IBM Pact

MARINA DEL REY, Calif. Amplex will supply ATM-13 tape drives to IBM under a contract valued at over \$600,000 initially, but which may go as high as \$3 million.

IBM will use the units in the Data Processing Subsystem it is building for the U.S. Air Force Airborne Warning and Control System (AWACS) under a contract from the Boeing Co.

Supershorts

Informatics has gained exclusive U.S. and Canadian marketing rights to Quick-Draw, a proprietary software package developed by National Computer Analysis, Inc.

Turnkey Systems, Inc. has appointed Hoskins Systems Ltd. as distributor of its Task-Master telecommunications monitor in the UK. Task-Master will serve the same role in France.

Four-Phase Systems Inc. has appointed Parvus Corp. Ltd. as exclusive Canadian sales representative.

Applied Data Research Inc. has registered the 2500R sale of a proprietary package. There are 1,759 Autoflow systems in the field, 611 Librarian systems, and 102 Metacolor packages with the rest distributed among the remainder of the firm's line.

Computer Hardware Consultants & Services has received a Federal Supply Schedule contract that includes field service and core memory for upgrading 360/30s to 256K.

Inland Associates will sell the Computer Memories (a division of Applied Magnetics) line of head-per-track disk memories to OI-Ms in the Midwest.

I/O Devices has signed a memorandum of understanding with Ricoh Co. of Tokyo, allowing Ricoh to purchase a 25% equity position in I/O. Ricoh will also have manufacturing rights to the I/O Model 100 printer on a world-wide basis under the agreement.

By a CW staff writer
NEWTON, Mass. There's no doubt about it — 1972 was one of the best years ever for mainframe computer shipments, according to International Data Corp., a computer industry research firm here.

Shipments by the mainframe computer makers during the year moved off the \$7 billion plus plateau and jumped to over \$9 billion, according to *IDC Industry Report*, a publication of the firm.

The total increase in worldwide shipments by the U.S. mainframe makers was up almost 25%, the firm reported after an analysis of the preliminary figures.

The firm also reported that all evidence available "indicates that at least two more healthy, if not booming, years are in store for the computer industry," predicting a 15% yearly increase in the installed computer base for 1973 and 1974.

Like the Good Old Days

IBM, as expected, paced the growth

Guzy Plan: IBM Should Spread Its Wealth Around to Users

NEW YORK — IBM's excess capital should be made available to users so they can finance computer purchases, whether or not those computer purchases are from IBM or other manufacturers, according to James Guzy, executive vice-president of Memorex.

Speaking here recently, Guzy claimed the "availability of IBM credit to all users of computers would open up a new source of capital to finance the acquisition of data processing equipment."

"Perhaps an analogy could be drawn to the operation of the General Motors Acceptance Corp. or to the General Electric Credit Corp.," he added.

Pointing out that the industry has reached a position of considerable importance in the national economy, as well as the U.S. balance of payments status, Guzy noted the issue of whether the industry can prove itself viable by free enterprise or face government-imposed controls is a critical one.

"The problem of financing, not technology, retards the development of the DP industry," he stated.

"It is true that we cast aside the myth that a company's expansion is limited only by its ability to perform and get its product accepted in the marketplace," he said.

"Access to capital on reasonable terms is antecedent to these acts. We should recognize that our industry has come into a phase of its development when the concentration of capital and initiative within a small number of companies is making not only its impact on the overall growth of the industry at large but also contributes to an unhealthy public feeling that the economic life of the nation is again all dominated by a few," he noted.

"IBM has the only true capital surplus in the business. The balance of the industry operates with a capital deficit. On this exceptionally critical point, the often cited figures of total market size and comparative market shares mean very little," Guzy continued.

"While IBM can make a yearly half billion dollar distribution of funds to its shareholders, its competition is dependent on a continued flow of outside capital contributions for the growth of their operations," he said.

"The capital imbalance in our industry begets the imagination. IBM pays out more in yearly dividends to its shareholders than the total capital which all its competitors are able to raise in a year,"

among U.S. computer manufacturers during 1972, a year that "will track up as one of those growth years reminiscent of earlier times in the computer industry," the firm declared.

It noted, however, that "this is the first real growth year for computer shipments since 1968."

According to the firm's preliminary figures, which are subject to revision "as additional inputs are analyzed," IBM shipped equipment valued at \$6.11 billion during 1972, a 34% increase over the shipments in 1971.

The only single company in the top eight showing a higher percentage increase was mini-maker Digital Equipment Corp., whose shipments were up 45% over the 1971 figure at \$185 million.

Big Loser

The only big loser of the year was the RCA computer operation, with shipments of \$60 million, or 50% of the shipments registered the previous year. This was

Guzy emphasized.

"Moreover, IBM retains an even greater amount in cash and liquid items because it cannot invest these excess funds to earn the same high rate of return that it has in the past," he said.

"I think it is a fundamental point that the result of adequate capital for our industry would be predictable savings to all computer users," Guzy asserted.

"Unquestionably, the many innovations outside IBM could, if properly financed, supply significant additional growth to the industry and great utility to the user," he continued.

Reinvest 'Excess' Lease Payments

Guzy proposed that "the so-called 'excess' lease payments those beyond recovery of costs and after a contribution to profit be reinvested in the industry to produce tangible benefits to the user community."

"The 'IBM credit window'... would be a major step in placing the burden of financing user acquisition of equipment where it more rightly belongs... that is, with the user and not with the manufacturer," he stressed.

But, he noted, "for a number of reasons we will likely never see outside pressure to move IBM to activate these vast funds in a manner which is not prejudicial to competition."

IBM Wins One

Judge to Screen 'Private' Papers

NEW YORK — IBM recently won a battle with the government in its antitrust suit when a federal Court of Appeals knocked down a pretrial order of Judge David Edelstein which would have allowed the Justice Department to use documents that IBM claimed were private.

The Court of appeals in a 2-1 decision ordered that "a judicial determination" of whether the documents were privileged would have to be made. So now a special judge will have to rule on each of the disputed 1,200 documents to determine whether Justice will be able to use them in its case.

In contesting the privacy of certain IBM records that had been turned over to Control Data and to the Justice Department in the pretrial proceedings in the two cases.

Under the early order calling on IBM to

expected, of course, since Univac took over the RCA case early in the year and began trying to shift customers to Univac machines.

Honeywell was third behind IBM and CDC in terms of shipment growth during the year, registering a 29% growth in 1972 over the 1971 figures. In all, Honeywell's shipments amounted to \$750 million.

Univac was close behind with shipments of \$420 million, a 26% increase over the previous year. Xerox managed a 17% increase in computer shipments, for a total value of \$50 million.

Control Data increased its shipments 12% during the year for a total of \$210 million. Burroughs and NCR were the only firms still in the mainframe business with less than a 10% gain in shipments. Burroughs, with shipments of \$405 million, was only 6% ahead of its shipment in 1971. NCR's shipments were up 5% with shipments of \$195 million.

In the non-mainframe area, the manufacturers of IBM plug-compatible peripherals showed only a 10% increase in shipments during 1972 over the 1971 figure. The total 1972 shipments for this group were estimated at \$440 million, IDC said.

IBM's share of the 1972 shipments was put at 66.9% of the total, IDC indicated, easily allowing it to maintain its lead in the installed equipment base.

Trying Harder

In the number two spot was Honeywell with 8.2% of the 1972 computer shipments, followed by Univac with 5.3% of the shipments during the year, when the shipments of RCA systems are accounted with 4.8% of the Univac shipments.

The independent IBM-compatible peripherals makers accounted for 4.8% of the shipments during the year, while Burroughs accounted for 4.4% of the dollar volume of shipments.

Following the leaders were Control Data with 2.3% of the 1972 shipment action; NCR with 2.1%; DEC with 2% of the total value; and Xerox with .5% of the total shipments.

"The bubble of oversell generated in the mid-to-late 1960s in the U.S. has finally been cleared from the pipeline," according to the firm, which indicated the "heavy wave of retirements has finally slowed as users begin to implement new and well-planned applications."

In addition, IDC indicated the importance of the overseas market to computer producers will hold steady in the next few years compared to the past two, when it was a major contributor to corporate profits.

produce the documents, the firm was given the right to retain those it felt were private or proprietary for one reason or another.

In the rush to produce the over 25 million documents that have so far been turned over in the case — documents said to weigh over 87 tons — IBM said it inadvertently let 1,200 of those documents slip through its censors.

The documents could be potentially embarrassing to the company and include the so-called Fawcett memorandum which discusses the reasons for IBM's price control in the market [CW Dec. 27/Jan. 3].

Edelstein had agreed with the Justice Department that these documents should be part of the case, claiming that since IBM had released them they were part of the public record.

Suppliers May Be Inhibited

Trade Secrets, Tax Issues Confuse Software Sector

This is the second in a series of articles dealing with the effect of the recent Supreme Court decision in the *Benton-Talbot* patent case. In the first article [CW, Dec. 27/Jan. 3] attorney Roy N. Freed discussed the impact on users. Here, excerpted from a copyrighted paper, he discusses the effect on the software industry.

By Roy N. Freed, Esq.
Special to Computerworld
One would hope that the misconception of the Supreme Court will not be misapplied in

the trade-secret area to diminish that mode of protection. That result would be truly serious for the country by jeopardizing the viability of software suppliers.

We have not yet begun to utilize digital computers to any significant portion of their potential. Programs make that utilization possible.

The software business promises to have potential of almost unimaginable proportions and should not be inhibited by the threat of commercial piracy and the resulting inability to cap-

talize fully on the large investments in the engineering effort represented by program design.

Just when programs are characterized as merely ideas or mathematical formulae, efforts are being made to tax their owners substantially, particularly on the basis that they are tangible personal property.

Unfair Taxing?

Ironically, there is a great danger that taxing authorities will misconceive their true nature in ways opposite to the

Supreme Court and consequently tax their owners unfairly by attributing greater value to the tapes and other new media than is proper, based on long-standing principles of valuation.

It is essential to recognize for taxation purposes also that program creation is engineering effort resulting initially in design specifications for information-processing processes. Thereafter, products, such as magnetic tapes, are made utilizing those specifications in order to carry

out the processes so devised.

Those processes must be valued carefully in light of the purposes of the engineering investment and by applying traditional principles to the actual facts. There are two key factors in valuation of magnetic tapes and related items.

First, it is necessary to recognize that the bulk of the engineering design expenditure is for the creation of a licensable or usable process rather than physical goods of the type that are marketable. Then, there is the new phenomenon that more than one copy of a magnetic tape is needed to make only a single use of the program processes.

Not Equal

Hence, each tape "copy" should not be valued equally. Instead, it should be recognized that there is a primary tape for the use of a program process and also a number of satellite or supporting tapes to facilitate that use of the primary tape.

These approaches can be the key to sound and fair valuation, taken in conjunction with the fundamental distinction already suggested between the cost of the design engineering effort and the values of the resulting primary tapes created and marketed or used.

The cost of that effort attributable to the marketable tapes should be allocated among the total quantity of primary tapes expected to be produced.

Common Factors

Thus, there are important factors common to both the design of measures to protect proprietary programs and the application of sales and use taxes and tangible personal property taxes to the new types of property. The proper handling of the protection tax might automatically achieve the fairest tax treatment for program marketers and users.

Since, as indicated, the marketing of programs property involves both licensing of trade-secret processes and the distribution of tangible items (e.g., magnetic tapes) for performing those processes by means of digital computers, it is advisable to characterize those two components expressly in the business transactions in just those ways and to price each of them separately in the correct relationship that reflects their relative values, usually allocating the larger charge to the process license fee.

Grisanti Named Pertec 'Acting' President

LOS ANGELES—Frank A. Grisanti has been appointed "acting president" and chief executive officer of Pertec Corp., replacing Harold A. Kurth, as part of a compromise settlement of a proxy contest. The annual meeting will resume Jan. 30.

Kurth and Stuart Mabon, former director, remain employees of the company.

A new board of directors was selected, and the number of directors reduced from six to five. Re-elected were Donald F. Elbridge and Robert A. Kleist.

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Microdata Unveils Tape 6000 Transport

IRVINE, Calif. — The Microdata Tape 6000 transport offers file search and rewind speeds of 200 in./sec. with instantaneous and long term tape speed variations of $\pm 1/2\%$.

The maximum data transfer rate is 72K char./sec (1,600 bit/in. at 45 in./sec.). A dual cap read/write head and an erase head are standard with the drive. The Microdata Tape 6000

The Tycom system requires very little or no modification of the interface electronics already in use with the 24-volt correspondence-coded Model 735, the firm said.

Price of the Tycom Model 73 for OEM quantities is \$835 with delivery 45 to 60 days from 750 Hamburg Turnpike.

Infomag Positions Heads

GOLETA, Calif. — The Model 35 head positioning system for rotating disk drives with performance characteristics similar to the IBM 3330 has been announced by Information Magnetica Corp. (Infomag), 5743 Thornwood Drive.

The system produces a stroke length of 2.14 in. (constant force), with a total stroke of 3.80 in. Access times to within .0002 in. of final position are 3.5 msec for .005 in. stroke, 22 msec for one-third stroke and 40 msec for full stroke.

A "pancake" keyboard designed for use with personal, portable electronic machines, from hand-held computers to educational toys and teaching machines, has been introduced by Mohawk Data Sciences Corp., Herkimer, N.Y. The thickness of new keyboard assembly is less than 1/10-in. Typical per station cost to the



Microdata Tape 6000 high volume user is 14 cents per station exclusive of cap. Delivery is 10 to 12 weeks.

An MOS/LSI Asynchronous



MDS Pancake Keyboard

Receiver/Transmitter, capable of half- or full duplex operation from Western Digital Corp., Newport Beach, Calif., can be programmed to transmit 1.5 stop bits.

New OEM Products

operates under any set of diagnostics, the firm said. The unit uses 10 1/2 in. reels with direct drive motors and offers either 7 or 9 track systems. Price in OEM quantities is under \$3,000, from 17481 Red Hill Ave.

Tycom Unit Replaces IBM 735 I/O Writer

POMPTON LAKES, N.J. — Tycom Systems Corp. has unveiled the Model 73, a plug-for-plug replacement for the IBM 735 I/O writer which utilizes the Holmes Tycom baseplate and converts any standard IBM Selectric I or Selectric II into an I/O printer.

Orders & Installations

General Electric Co.'s Re-Entry and Environmental Systems Division has ordered a multisensor System 86 from Systems Engineering Laboratories, Inc. The unit will be linked with 12 environmental test chambers to acquire, process and display test data for aerospace hardware development programs.

Region IV Education Service Center, Houston, Texas, has purchased and installed a Control Data 6600 system to expand its administrative services and student instruction capabilities.

Irving Bank and Trust Co., Irving, Texas, has installed a Burroughs B3500 to handle check processing and internal applications as well as outside services.

The Times Publishing Co., St. Petersburg, Fla., has ordered two Honeywell 2000 and two Data-net/2000 front-end processors for both business and production tasks.

Castletons, Inc., a Salt Lake City retail chain, is installing Model 726 point of sale terminals made by the Sweda International Division of Litton industries.

United Services Life Insurance Co. has leased an AU 100 Data Entry System from CS, Inc.

Northrup Corp.'s Aircraft Division, Hawthorne, Calif., has ordered a multi-mode interactive CRT display from Information Displays, Inc. The system will be used with Northrup's Large Amplitude Flight Simulator.

The U.S. Trust Co. of New York has purchased the Automated Tape Library Accounting System from GTE Data Services Inc.

The Sarasota County Board of County Commissioners (Fla.) is installing an NCR Century 200 which will be used by the sheriff, the board of tax assessors and for utility billing.

Some IBM 360 users have chosen to upgrade their existing systems rather than jump into a 370. Many others still face this important decision. And if you're in that position, our January 31st Supplement will be a big help.

Supplement Editor Ron Frank has talked to users who have upgraded, and he'll report on their experiences and problems. Cost factors will be analyzed, and there will be a survey of the various tools now available for upgrading a 360, including:

- Independent main memories
- Faster peripherals
- D.A.T. Boxes
- Independent software

If you're a 360-user, you'll find a lot to think about in this supplement. And if you have a product or service which can up a 360, you should be advertising in this special supplement. Your Computerworld representative can give you all the details. Or call Judy Milford at (617) 332-5608

On January 31st, Computerworld shows "How to upgrade your 360."



Univac Pronounces '72 'One of the Best'

BLUE BELL, Pa. — For Univac, 1972 was "one of the best fiscal years in the division's history," according to Gerald G. Probst, president of the Sperry Rand Corp. division.

"Revenues are better than 30% higher for the first 11 months of 1972 over the comparable period last year," he noted, adding: "Our bookings for commercial products are also running about 30% higher for the same period."

The good showings, he said, were primarily "due to the renewed strength of the U.S. economy which continues to recover from the recession."

"We are finding that the economy's increasing strength is instilling greater confidence in users with the result that they are accelerating computer acquisitions and implementing decisions that were postponed during the recession," he added.

Growth Abroad

In addition, he said, the continuing market growth in Europe and Japan is "encouraging," but he warned that "it is impossible to forecast" the possible effects of European discussions relating to a combined computer operation between the UK, France and West Germany.

"Naturally we would be concerned if any proposals for trade barriers limiting U.S. exports of computers should be erected," he stated.

"Conversely," he added, "we believe that our own domestic market should be open to non-U.S. manufacturers in the spirit of free, competitive trading."

In the past year, Probst said the acquisition of the RCA customer base has "continued to be highly successful. The rate of retention of this customer base is over 90%," he noted.

In the future, he said, with the U.S. shifting its resources away from the defense area toward "cooping with domestic social-economic needs, we expect to see a strong demand for our computer systems in the state

and local government area.

"At the same time we look forward to controlled growth in the defense sector as the Armed Forces, faced with the high costs of an all-volunteer force, seek to utilize more automation as a way of reducing expenses."

Probst also predicted increased business in the areas of special technology systems, such as those used in air traffic control operations.

Executive Corner

■ Walter R. Oreamuno, chairman of the board, has been named chief executive officer and chairman of the Management Assistance Inc. (MAI) executive committee, succeeding Jorge M. Gonzalez.

■ Richard J. Elkus has been elected chairman of the board of directors of Ampex Corp.

■ W.F. Goodyear has been appointed vice-president, Nasdaq system at Bunker Ramo Corp.'s Information Products Division. He will be responsible for planning and implementation of new enhancements to the automated stock quotation system.

■ William Rennie and Harold Proctor have been appointed Eastern and Western vice-president, respectively, of Potter Data Products Service, Inc.

■ Martin L. Cohen has been appointed vice-president and general manager of International Teletypewriter Corp., a subsidiary of The Singer Co.

■ Robert G. Clark and George A. Reed have been elected to the board of directors of Data 100 Corp.

■ E.W. Green has been named president of Intercon Systems. James M. Shroder becomes chairman of the board.

■ Roger L. Buiten has rejoined Ann Arbor Computer Corp. as vice-president and marketing manager.

■ Burroughs Corp. named three new vice-presidents: Edward W. Scheuing, manufacturing, corporate staff; Fitz R. Caudle, field marketing, International Group; and William TenBink, marketing, Western region, Business Machines Group.

■ Wesley J. Hennessy and Bernard D. Loughlin are new members of Hazeltine Corp.'s board of directors.

■ George Toor has been elected vice president, marketing, by Wango Inc.

Position Announcements

PROGRAMMER/ANALYST

A leading national consulting firm has an immediate opening for a computer programmer with experience in the transportation planning field in Washington, D.C. Minimum requirements: college degree; 1-2 years programming experience; FORTRAN, COBOL or PL/I knowledge; JCL familiarity on any large scale computer system; operational familiarity with major transportation planning computer packages. Desire a quick learner, with ability to communicate and willingness to expand computer language and hardware knowledge.

Salary commensurate with experience level plus participation in attractive bonus plan. Submit resume to:

L.F. Wright
10th Floor, 1025 Connecticut Avenue, N.W.
Washington, D.C. 20036

EDP AUDITOR Salary To \$18,000

This is an exceptional growth opportunity for a highly motivated individual with auditing and data processing experience. Working out of our Cincinnati headquarters, he will have the opportunity to apply his knowledge of auditing and of EDP in a professional atmosphere to the sophisticated computer installations at our divisions.

Candidates for this position should have a minimum of 2 years in systems and programming of accounting applications; 2 years experience in public or internal auditing is desirable. College training in accounting is essential. All candidates must be poised, skilled communicators who have the ability and motivation to advance to supervisory positions at our headquarters or in one of our divisions.

The starting salary range for this position is \$13,000-\$18,000.

If you have the above qualifications send your resume with salary history in complete confidence to:

CW Box 3766
60 Austin Street
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An Equal Opportunity Employer

SYSTEM PROGRAMMERS DESIGNERS & ANALYSTS

The System Development Corporation, a leader in the development and application of information technology, has openings for programmers, designers and analysts in Virginia Beach, Virginia, and other locations with its fastest growing division.

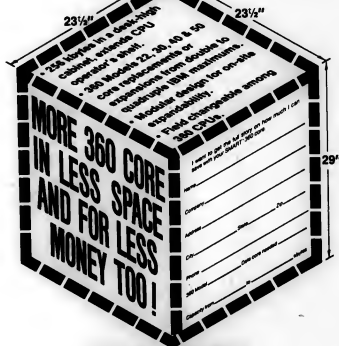
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- CMS-2, ULTRA32, GS-1
- Shipboard Weapon Subsystems
- Shipboard Command and Control
- Airborne Data Systems
- Digital Data Link Applications
- Real-Time Executives
- Data Base Management Systems
- Satellite Navigation Systems

We will be conducting LOCAL INTERVIEWS in the near future. For consideration, please send your resume with complete salary information to:

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Due to expansion, leading national equipment lessor has immediate requirements for three experienced computer marketing representatives to become our Regional Managers. In these newly created positions you will be responsible for second-year leasing of a \$180 million IBM 360 portfolio in our Eastern, Midwest and Southwest regions.

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To these qualified individuals we offer excellent salaries, incentive bonus, year-end profit sharing plan. Please send complete resume including earnings history in strict confidence to:

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BANKERS LEASING CORP.
Marketing Representative for
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career opportunity

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Candidates should have a Bachelor or Masters Degree in Science, Engineering, Economics, Business or Computers, plus three to five years working experience in applications systems development and programming utilizing IBM 360/370 computers or equivalent technology.

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Qualified applicants are invited to submit application forms and resumes in confidence to:

886-294-268

Mr. C. Lukenbill,
Supervisor of
Employment
Manpower Dept.

Box 2100,
Calgary, Alberta
T2P 2M5

THE CITY OF CALGARY

POSITION ANNOUNCEMENTS POSITION ANNOUNCEMENTS

LARGE SCALE
DATA
PROCESSING

SYSTEMS ANALYSIS - Experience in the analysis, design and/or implementation of large (real-time) DP applications are required for the analysis and evaluation of DP subsystem requirements associated with BMD systems. Analysis will include the review and interpretation of system and DP subsystem level requirements. Evaluation of DP subsystem requirements will be based upon analysis and will utilize simulation tools defined by systems analysts.

SOFTWARE TEST - Experience in the analysis, design and/or implementation of software test procedures of large (real-time) DP applications. Analysis will include review of basic requirements test procedure requirements and evaluation of test procedure requirements as well as development of tools to support above activity. Knowledge of large DP Subsystem integration procedures desirable.

SIMULATION - Experience in the analysis, design and implementation of large digital simulations are required for the development of simulations of BMD systems. Systems to be analyzed include the requirements and design of Real Time Operating Systems, and BMD Applications Programs. Three to five years experience in large scale, real-time digital simulation is preferred.

OPERATING SYSTEMS - System programmers/designers/analysts with experience in CDC 6000/7000 hardware/software (or other comparable systems) end/or large scale operating systems are required to perform operating system analyses to include the review of requirements, design concepts, and testing utilizing software tools, e.g., simulations, where applicable.

SUPPORT SOFTWARE - Experience in the design, analysis or implementation of high-level problem oriented languages designed to support

- o the automated construction of large real-time (non-real-time) software packages
- o data reduction and analyses routines
- o report generation

are required. Three to five years experience in large scale digital computer systems with FORTRAN/assembly language background is preferred. All openings require a degree in a scientific discipline (M.S. and Ph.D. preferred)

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1	4468, 4780, 4856		1	2401-2 (B T-1)	No. 27808
1	6060, 7620, 7915		1	8053, 8652	
1	1061-11	No. 59972	1	2401-2 (B T-1)	No. 27813
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1	1062-8		1	2211-1	No. 34643
1	9971		1	8122	No. 34644
1	1423-N1	No. 27208	1	2211-1	No. 34677
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DUCS-V will be available during the 3rd quarter of 1973. Version 6 will support both local and remote IBM 3270 Display Stations providing users with a convenient means of utilizing the enhancements of the IBM 3270 System.

Requests for DUCS-V should be submitted to C. F. S. License agreements, DUCS-V abstracts and other details will be sent by return mail. Inquiries may be directed to Mr. Richard K. Goren.



MDS Six-Month Earnings Decline, Reflect Rental Program Expenses

HERKIMER, N.Y. - Substantially lower six-month earnings at Mohawk Data Sciences, Corp. (MDS) continued to reflect the expenses of the firm's rental program with the System 2400 and KDS systems. Revenue, however, rose to a record \$68.5 million, of which \$39.1 million came from rentals and service income.

"While the staggering costs of expanding a worldwide systems sales and field service force continued to be expensed as incurred, the impact on current earnings is beginning to lessen now that a viable base of systems has been placed by our marketing organization," observed President R.P. Rifenburgh.

"As a result of special marketing programs designed to enhance the order rates of our other rental equipment and systems," he added, "we are seeing additions to the installed base of our earlier lines and our total backlog reaching near-record levels."

"Furthermore, we have accelerated

our efforts for the outright sale of equipment and systems. These efforts have begun to bear fruit as evidenced in the recently announced Burroughs Corp. and AEC contracts valued at approximately \$5 million and \$4.3 million respectively," he added.

"We are completing the transitional phase of our development as a systems supplier which began more than two years ago. Our progress has not been without its setbacks nor has it always been evident in our financial results," Rifenburgh stated.

Earnings for the six months ended Oct. 31 totaled \$301,000 or 5 cents a share compared with \$1 million or 18 cents a share in the same period a year ago. Revenues rose to \$68.5 million from \$54.7 million in the same 1972 period, and included \$5.1 million from the sale of rental equipment to Randolph Computer Corp. under a previously announced agreement.

MDS has agreed in principle to acquire Elastolabs, a manufacturer of ink reservoir rolls, Rifenburgh said.

Potter 1st Period Earnings Rise

PLAINVIEW, N.Y. - Potter Instrument Co., Inc. has started off its new year with earnings of \$141,000 or 5 cents a share in the first quarter ended Sept. 30.

This compares with a loss of \$49,000 or 2 cents a share in the comparable period of 1971, which has been restated to reflect various charges totaling about \$15 million taken for the year ended June 30.

Revenues grew to \$10.7 million from \$7.1 million in the year-ago period.

Orders from original equipment manufacturers continue to increase totaling almost \$11 million in the quarter, up 140% from the year-ago period, the firm said. This figure represents a 56% improvement over the immediately preceding quarter. OEM sales for the period were almost \$6 million, 50% more than in the year-ago period.

In the year ended June 30, Potter decided to write down about \$9.7 million in deferred expenses on rental and service of equipment and also on R&D expenses.

Potter also reduced the book

value of rental equipment by about \$3.4 million, and made provision to write off certain obsolete and excess inventory, for about \$1.9 million before taxes.

Restated, the loss for the previous year totaled \$13.1 million or \$4.76 a share.

Datapoint Expects Quarter Turnaround

SAN ANTONIO, Texas - Datapoint Corp., formerly Computer Terminal Corp., expects earnings of about \$156,000 or 4 cents a share for the first quarter of fiscal 1973 compared with a loss of \$607,000 or 18 cents a share for the restated period of 1972.

Revenues skyrocketed to \$2.8 million from \$720,000 in the year-ago quarter ended Oct. 31. Shipments of the Datapoint 2200 Intelligent Data Handling System have continued to increase, and accounted for 77% of shipments in the quarter, the firm said.

While you're still thinking about it, why not pick up your phone and call—collect—Robert Kenney, Vice President, at (305) 524-1559. Of course you aren't obligated in any way.

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If you've already been successful in business, if you have better-than-average management ability, and want to enlarge your world as well as your income, you should think about coming to Florida right now (the weather's fine, by the way) to discuss an opportunity that just may not be available to you a few weeks from now.

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Nickels & Dimes

Burroughs has declared a quarterly dividend of 16 cents a share payable Jan. 20 to shareholders of record Dec. 22.

355
Dataflux, developer of a fixed read/write head for disk drives, has obtained \$200,000 from local private investors and completed an internal financial reorganization, which will enable it to begin immediate production of the units.

355
Spectronics' total backlog reached \$1.8 million the end of September, up 139% from last year. The firm makes optoelectronic products and functional assemblies for peripheral gear. Earnings turned around to \$47,000 in the half, from a loss of \$40,000 in the same 1971 period.

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CLOSING PRICES THURSDAY, JANUARY 4, 1973

	1972 RANGE	CLOSE JAN 4	2-WEEK CHANGE	PCT FCH
SOFTWARE & EQUIP SERVICES				
O ADVANCED COMP TECH	1-3	2 1/8	+ 1/4	+15.3
O APPLIED DATA RES.	3-3	3 7/8	+ 1/4	+14.8
O APPLIED LOGIC	1-4	2 3/4	+ 1/4	+9.3
N AUTOMATIC DATA PROC	12-99	90 1/2	+ 1/8	+0.1
O BRANSON APPLIED SVST	2-2	7/8	+ 1/8	+12.5
O COMPUTER DIMENSIONS	1-14	4	+ 1/4	+6.6
O COMPUTER DYNAMICS	1-4	1	0	0.0
O COMPUTER NETWORK	3-7	3 1/2	+ 1/4	+6.6
N COMPUTER SCIENCES	4-10	5 1/4	+ 1/2	+10.5
O COMPUTER TASK GROUP	1-2	1 1/4	0	0.0
O COMPUTER TECHNOLOGY	3-8	2 7/8	+ 1/4	+6.0
O COMPUTER USAGE	7-14	8 7/8	+ 1/2	+5.5
N COMPUTING & SOFTWARE	14-28	14 1/2	+ 1/4	+1.1
O COMPRESS	1-3	3 1/8	+ 1/4	+22.2
COMSHARE				
O COMSHARE	5-10	7 3/4	+ 1/8	+1.5
O DATASAT	4-9	4 1/8	+ 1/8	+3.1
O EDP RESOURCES	2-8	2 3/4	0	0.0
A ELECT COMP PROG	1-5	2	+ 1/4	+14.2
N ELECTRONIC DATA SYS.	5-8	5 3/4	+ 1/4	+8.5
O INFORMATICS	5-11	5 3/4	+ 3/4	+15.0
O I.O.A. DATA CORP	1-3	5/8	+ 1/4	+66.6
KEANE ASSOCIATES				
O KEANE CORP	4-7	3 3/4	+ 1/4	+1.7
O LOGICON	4-9	4 5/8	+ 1/8	+2.7
O MANAGEMENT DATA	3-4	3	+ 1/4	+1.7
O NATIONAL CSS INC	8-31	29 3/8	+ 2 7/8	+10.8
O NATIONAL INFO SVCS	1-5	1 3/8	0	0.0
O ON LINE SYSTEMS INC	1-2	3 1/4	+ 3/4	+10.7
PLANNING RESEARCH				
O PROGRAMMING & SYS	20-25	24	- 1/2	-2.0
O PROGRAMMING & SYS	1-2	1 1/8	0	0.0
O SCIENTIFIC COMPUTERS	2-4	1 5/8	0	0.0
O SIMPLICITY COMPUTER	1-2	3 1/4	+ 1/4	+1.7
O TBS COMPUTER CENTERS	3-6	3 7/8	+ 3/4	+24.0
TCC INC				
O TTSWARE INC	7-11	5 5/8	+ 3/8	+6.0
O UNIVAC DATA CENTER	5-27	23 3/4	+ 1/4	+1.7
N UNIVERSITY COMPUTER	0-26	5 1/8	- 1/10	-10.4
A URS SYSTEMS	1-2	3 1/4	+ 3/4	+10.7
PERIPHERALS & SUBSYSTEMS				
N ADDRESSOGRAPH-NULT	32-49	38 1/2	+ 1 3/8	+4.2
O ADVANCED MEMORY SYS	12-23	16 1/2	+2	+13.7
N AMPEX CORP	5-15	6 3/4	+ 3/4	+12.5
O ANIMATED PAPERWORK	5-12	5 1/4	0	0.0
O BEVING MEDICAL ELEC	8-8	6 1/2	+ 1/4	+1.9
A BOLLERBERN & NEW	9-14	9 7/8	+ 5/8	+6.7
O BOLLERBERN	9-14	9 7/8	+ 5/8	+6.7
A CALCOP	9-25	12	+ 1/4	+11.6
O CAMBRIDGE MEMORIES	10-15	13 1/2	+ 1/4	+10.7
O CENTRONICS DATA CORP	2-28	32 1/2	+ 1/2	+1.7
O CODEX CORP	6-29	19	+ 5/8	+3.4
O COMINTONICS	2-9	2 5/8	+ 1/8	+5.0
O COMPUTER COMMUN.	2-3	3 1/8	+ 3/8	+16.6
A COMPUTER EQUIPMENT	2-4	2 5/8	+ 3/8	+16.6
O COMPUTER MACHINERY	7-13	10 3/8	+ 1/4	+13.4
O COMPUTER TRANSCEIVEP	7-9	5 1/4	+ 1/8	+2.1
A COMPUSET	3-9	9	0	0.0
N COMPAR CORP	24-31	31 7/8	+ 1 3/8	+6.3
O DATA PRODUCTS CORP	3-7	7	+ 1/4	+6.6
O DATA RECOGNITION	1-5	1 1/4	0	0.0
O DATA TECHNOLOGY	2-5	2 1/2	+ 1/4	+11.1
OLVAN CONTROLS				
N ELECTRONIC M. & M.	0-8	4 1/4	+ 1/8	+5.0
O FARRITEK	5-8	5 3/8	+ 1/2	+10.2
O GENERAL COMPUTER SYS	2-5	3 3/4	+ 1/4	+6.2
N GENERAL ELECTRIC	5-74	72 7/8	+ 1/2	+6.5
N HAZELTINE CORP	7-13	8	+ 1/4	+1.7
O INFOWARE INC	20-25	22 1/2	+ 1/4	+11.1
INFORMATION DISPLAYS				
O INFORMATION INTL INC	8-25	14 3/4	+2	+15.6
O KIMLEY ELECTRONICS	4-14	8 3/8	+ 1/2	+6.2
O MANAGEMENT ASSIST	1-1	1 1/8	0	0.0
A MILGO ELECTRONICS	15-24	21 7/8	+ 5/8	+2.4
O ORTHOM DATA CORP	15-27	12 7/8	+ 1/4	+7.7
O ODC COMPUTER SYS.	6-12	5	- 1/2	-0.0
OPTICAL SCANNING				
O OPTICAL SCANNING	6-16	6 1/4	+ 3/4	+13.6
O PERTEC CORP	7-17	8	+ 1/8	+1.5
O PHOTON	6-15	3 1/8	+ 1/8	+2.0
A POTER INSTRUMENT	7-21	8 1/4	+ 3/8	+6.3
O PRECISION INC	7-13	1 1/4	+ 1/4	+11.1
O RECOGNITION EQUIP	5-15	7 3/8	0	0.0
N SANDERS ASSOCIATES	13-21	17 1/4	+ 1/4	+1.4
SCAN DATA				
O SCAN DATA	5-13	4 7/8	+ 3/4	+13.3
N SCIENTIFIC TECHNOLOGY	3-9	3 3/4	+ 1/8	+2.4
O SECUR INC	7-11	9 1/4	+ 1/4	+2.7
O SALLY CORP	1-1	1 1/4	+ 1/2	+12.5
N TEKTRONIX INC	74-66	49 7/8	+ 7/8	+1.7
N TELEX	6-15	5 3/4	0	0.0
O WILKIN INC	10-26	17 1/2	+ 3/4	+6.4
SUPPLIES & ACCESSORIES				
O BALTIMORE BUS FORMS	5-9	7 1/2	+ 1/2	+25.0
A BARRY WRIGHT	1-4	12 3/8	+ 5/8	+5.3
A BSA DOCUMENTS	4-6	5 3/4	+ 1/4	+6.5
O DUPLEX PRODUCTS INC	8-16	9 1/2	+ 1/4	+2.5
N ENNIS BUS FORMS	6-10	8 3/8	+ 1/4	+17.5
O GRANAM MAGNETICS	15-27	19	+ 1/2	+1.7
O GRAPHIC CONTROLS	11-15	12 1/4	+ 3/8	+2.9
N 3M COMPANY	76-86	85 1/2	+ 3 1/2	+4.2
O HODGE CORP LTD	42-42	56 3/4	+ 1/2	+0.8
N NASHUA CORP	42-42	56 3/4	+ 1/2	+0.8
O REYNOLDS & REYNOLD	37-77	47 1/4	+ 1/2	+5.4
O STANDARD REGISTER	14-20	18 1/2	+ 3/8	+2.0

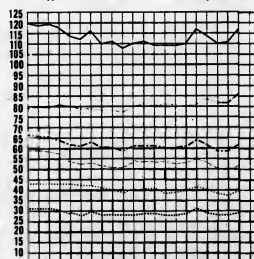
CLOSING PRICES THURSDAY, JANUARY 4, 1973

	1972 RANGE	CLOSE JAN 4	2-WEEK CHANGE	PCT FCH
TAH PRODUCTS CO				
N UARCO	21-28	21 5/8	- 7/8	-3.8
A URS MAGNETICS	15-17	17 1/2	+ 3/4	+12.5
N WALLACE BUS FORMS	21-26	24 5/8	0	0.0
COMPUTERS SYSTEMS				
N BURROUGHS CORP	147-229	224 1/4	+8 3/8	+3.8
N COLLINS RADIO	16-27	28	+ 1 7/8	+6.1
N CONTROL DATA CORP	43-74	68 3/4	+2	+3.4
O DATA GENERAL CORP	50-111	112	+2	+1.8
O DIGITAL CORP CONTROL	5-25	5 3/4	+ 3/4	+15.0
O DIGITAL EQUIPMENT	102-101	93 1/2	+ 1 1/4	+3.6
N ELECTRONIC ASSOC.	6-13	8 1/4	+ 3/4	+4.7
A ELECTRONIC ENGINEER				
N EKKORD	23-41	31 3/8	+ 1/8	+1.5
O GENERAL AUTOMATION	13-49	48 3/4	+ 1/4	+12.0
O GRI COMPUTER CORP	2-5	5 1/2	0	0.0
O GENERAL AUTOMATION	42-88	87 3/4	+ 1/2	+6.0
N HONEYWELL INC	118-170	135	+4 5/8	+3.5
N IBM	333-426	411 3/4	+26 1/4	+6.4
INTERDATA INC				
N INTERDATA	8-16	11 1/4	+ 5/8	+16.8
N KODAK	15-18	17	+ 3/8	+1.1
O KODAK DATA CORP	5-10	8 3/4	+ 1/2	+6.0
N NCR	28-38	31 7/8	+ 1/4	+5.8
N RAYTHEON CO	27-47	47 1/8	0	0.0
N SPERRY RAND	30-50	49	+ 7/8	+1.8
N SONY CORP	7-16	7 3/4	+ 1/8	+8.8
VARIAN ASSOCIATES				
N WANG LABS	14-22	18 1/2	+ 1	+5.7
N XEROX CORP	23-31	32	+ 1 1/4	+14.7
N XEROX CORP	121-172	152	+4 5/8	+4.5
LEASING COMPANIES				
A ADOTHE COMPUTER	3-18	3 1/8	0	0.0
O BINSNAN CORP	1-3	3 1/2	0	0.0
O COMECON INC	3-18	10 1/2	+22	+22.2
O COMECON GROUP CORP	5-11	6 1/8	+ 1/8	+2.0
O COMPUTER EXCHANGE	7-13	13 1/8	+ 1/8	+1.2
A COMPUTER INVESTS GRP	7-14	7 1/2	+ 3/4	+11.1
O COMP. INSTALLATIONS	2-5	2	0	0.0
N DDP INC	5-13	5 3/4	+ 1/8	+2.2
N DYNAMIC RENTAL	2-6	2	+ 1/8	+1.5
A DOL INC	2-10	2 7/8	+ 1/2	+21.0
A DEARBORN-STORM	14-28	22 1/4	+ 3/4	+17.1
A DPA, INC	5-8	8 1/8	+ 1/8	+1.7
A GRANITE HGT	5-11	6 1/4	+ 3/8	+5.3
A GROUNDSHED COMPUTER	6-11	6 1/8	+ 1/8	+2.0
A ITEL	7-12	11 1/4	+ 3/8	+3.4
N LEASCO CORP	17-24	18	+ 3/4	+4.3
O LEASPCORP	6-15	6 3/4	+ 1/8	+1.8
N LECTRO HST INC	1-4	2 1/4	+ 1/4	+12.5
A ROCKWOOD COMPUTER	2-7	2 7/8	+ 5/8	+27.7
O SYSTEMS CAPITAL	3-10	3 1/4	+ 1/4	+1.5
N U.S. LEASING	19-34	33 5/8	+ 3/8	+11.1

CHC=NEW YORK EXCHANGE A=AMERICAN EXCHANGE
D=NASDAQ STOCK MARKET O=OVER THE COUNTER
P=PRIME-1/8%+1/4%
(1) TO NEAREST DOLLAR

Computer Stocks Trading Index

Computer Systems ----- Software & Equip
----- Peripherals & Subsystems ----- Leasing Companies
----- Supplies & Accessories ----- CW Composite Index



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SEPT OCT NOV DEC

Earnings Reports

BRADFORD COMPUTER & SYSTEMS

Three Months Ended Sept. 30

1972 1971

Revenue \$8,787,077 \$3,186,115

Spec Item \$1,571,345 \$603,371

Earnings 461,354 277,382

9 Mo Shr 4.41

Revenue 23,231,313 9,828,703

Spec Item 659,313 (485,288)

Earnings 1,414,817 734,121

9 Mo Shr 7.32

-Includes accounts of Bradford Shareholder Services in which the company held 8% of the common stock since Jan. 4, 1972, and accounts of BT Bradford Stock April

in which the company acquired a 78% interest in common stock April

4, 1972. b-Retained. c-Credit tax credit last charge for conversion costs. d-Debit; charge for conversion costs last tax credit.

OPTICAL SCANNING

Three Months Ended Sept. 30

1972 1971

Revenue \$2,444,190 \$2,204,993

Loss 49,961 501,895

-Restated to reflect results of inclusion inc. acquired in August 1971 on a pooling-of-interests basis.

ELECTRONIC DATA SYSTEMS

Three Months Ended Sept. 30

1972 1971

Shr End 26,077,885 \$0,471,281

Earnings 3,179,079 2,588,330

LOGIC

Nine Months Ended Sept. 30

1972 1971

Shr End \$2,370,777 \$3.30

Revenue \$2,370,777 2,511,927

Earnings (61,096) \$157,500

-Tax loss carryforward.

SYCOR

Three Months Ended Sept. 30

1972 1971

Shr End 6.32

Revenue 3,835,000 1,785,660

Tax Credit 148,000 (157,400)

Earnings 971,000 6,157,500

9 Mo Shr 8.00

Revenue 4,334,000 1,454,600

Earnings 434,300 (1,454,600)

SYSTEMS ENGINEERING

LABORATORY

Three Months Ended Sept. 29

1972 1971

Shr End 1.14 8.11

Revenue 344,000 321,000

Spec Item 362,000 271,000

Earnings 562,000 271,000

-Gain from sale of building and land and tax credit. b-Tax credit.

APPLIED DATA RESEARCH

Nine Months Ended Sept. 30

1972 1971

Shr End 8.03

Revenue 6,420,000 45,500,000

Disc Op (12,899) (10,745,65)

Earnings 21,757 (288,289)

-Restated to conform to 1972 operations. c-From continuing operations. d-From continuing operations.

COMPUTER INSTRUMENTS

10 Months Ended Oct. 6, 1971

1972 1971

Revenue \$3,353,097 \$2,894,091

Earnings 55,761 (158,328)

GRANAM MAGNETICS

Three Months Ended Sept. 30

1972 1971

Revenue 2,400,000 2,100,000

Spec Item 33,340 33,340

Earnings 220,403 284,207

a- Revised.

STERLING COMPUTER SYSTEMS

Three Months Ended Sept. 30

1972 1971

Shr End 8.07 8.13

Revenue 875,416 897,593

Spec Item 2,329

Earnings 51,564 86,907

9 Mo Shr 11.18

Revenue 1,349,7

GE's new Mark III gives you real control of time-sharing costs

If you think time-sharing is a good thing gone wild, we have a way to tame it. It's General Electric's Mark III.

Mark III is not just another time-sharing system, but a new approach to information processing. It's a single, unified service that combines the response of interactive time-sharing, the economy of remote batch processing, and the reach of a worldwide communications network.

Mark III has a comprehensive budget control system that lets you allocate computing dollars—by project, department, individual—tailored to your needs. It will automatically administer the allocations. And even give you daily reports at your own terminal.

Mark III not only helps you control costs, but actually reduce them. You can save one-half or more of your processing costs just by moving your time-sharing programs into remote batch operation.

Mark III is an integrated network of

nearly 100 interconnected computers.

With a network this size, each computer performs that task for which it's best suited—communications, interactive time-sharing, or batch processing. The result is a service that can tackle all your computing easily, reliably, and economically.

General Electric was first to introduce time-sharing service in 1965. First to establish an international information processing network linking over 250 locations in North America and Europe. And now, with Mark III, first to put you in real control of your computing dollars.

If you're a Mark II user, Mark III offers you major new features and is fully compatible. If you're not, it's time to make a serious comparison of Mark III with whatever information service you now use. Take control. Phone 800-638-0971 or write us at 7735 Old Georgetown Rd., Bethesda, Md., 20014. We're ready to help.

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